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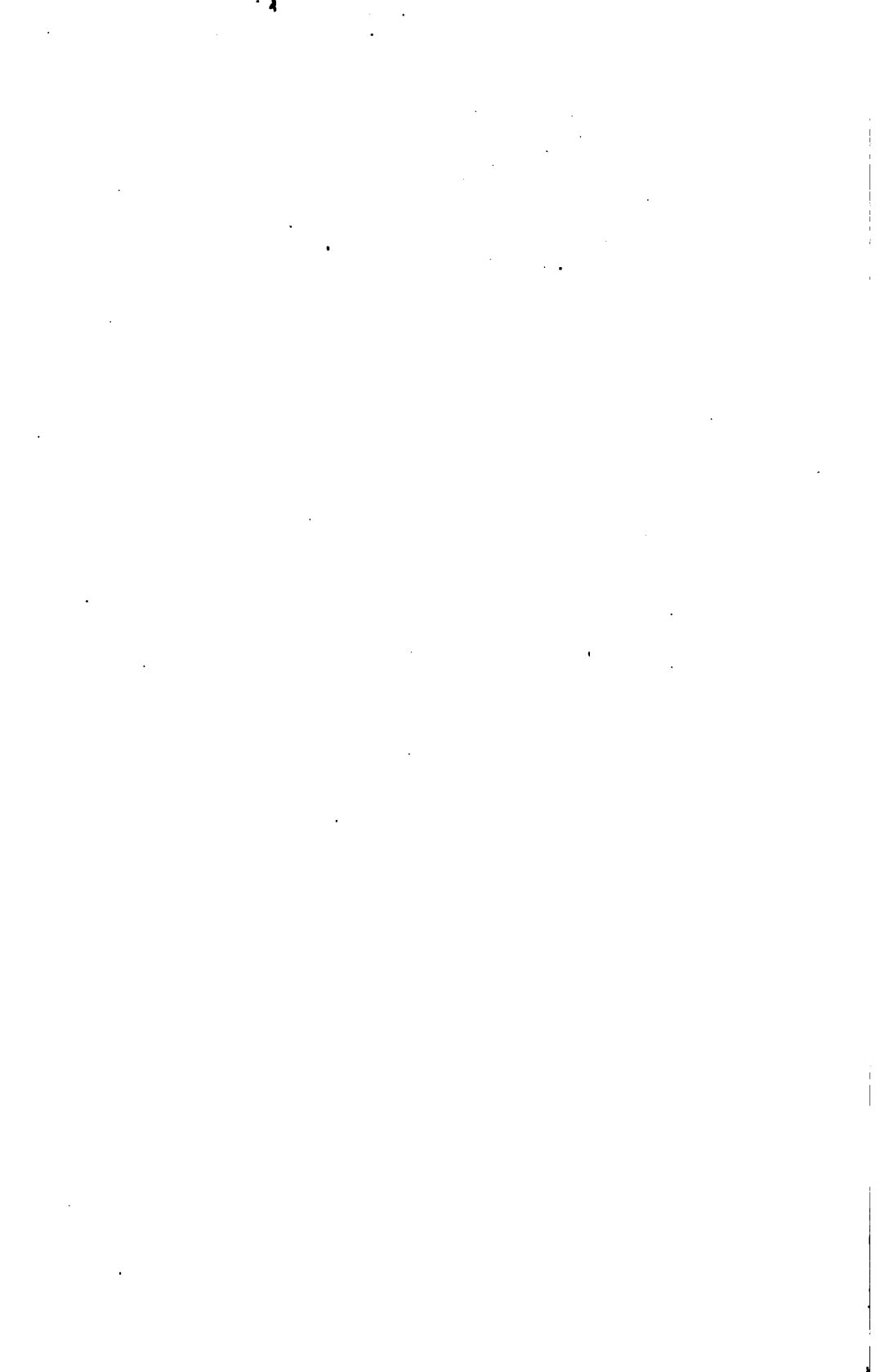
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FRONTISPIECE.—Main section of exhibit of State Board of Horticulture, in Horticultural Building, California Midwinter International Exposition, 1894.

F. G. KRAUSS,
AGRICULTURIST.

FOURTH BIENNIAL REPORT

OF THE

STATE BOARD OF HORTICULTURE

OF THE

STATE OF CALIFORNIA,

FOR 1893-94.



SACRAMENTO:

STATE OFFICE, : : : : A. J. JOHNSTON, SUPT. STATE PRINTING.
1894.

CALIFORNIA STATE BOARD OF HORTICULTURE.

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L. W. BUCK, Vice-President.....Vacaville.
Commissioner for the Napa District.

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B. M. LELONG, Secretary.....Ex officio Chief Horticultural Officer.

ALEXANDER CRAW.....Quarantine Officer and Entomologist.

ELLA F. HALLAHAN.....Clerk.

OFFICES:
No. 220 SUTTER STREET, SAN FRANCISCO, CAL.

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1892/94

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I.

REPORT.

To his Excellency H. H. MARKHAM, Governor:

In accordance with law, we have the honor to submit herewith our report for the years 1893-4.

REPORT FOR 1893.

In 1889 the law governing the time of issuing reports of this Board was changed from biennially to annually. Since then we have published four annual reports—1889, 1890, 1891, 1892. In 1891 a general law was passed changing the time of making reports from annually to biennially. The report for 1892 being the fourth and last one issued annually, the present report becomes the fourth biennial report, and the tenth issued since the creation of this department.

MEETINGS OF FRUIT GROWERS.

During the year we have, at various times, called the fruit growers of the State in general convention, for the consideration of subjects of great importance to their industry, and in which we have had their coöperation. In November, 1892, the Sixteenth State Convention was held, under the auspices of the Board, at San José, and was largely attended by representative fruit men. In November, 1893, the Seventeenth Convention was held in Los Angeles, continuing in session four days. The proceedings of these two conventions are embodied in the present report, the contents of which will prove, as have all others published by the Board, of incalculable value to the fruit growers of the State, being deductions from practical and experienced men, who have devoted years to the development of this great industry—Horticulture.

In July last, a convention of persons interested in the culture of the olive and the manufacture of olive oil was held at the offices of the Board in San Francisco, which was largely attended and many valuable papers were presented. The proceedings were published in pamphlet form and given wide circulation. Placing such information before the public has had the effect of creating in the minds of the people a knowledge of the great importance of a more general use of pure olive oil as food and for medicinal purposes. It has also called the attention of the people to the wholesale adulteration of food products, where the price can be cheapened by the admixture of worthless and dangerous substances, and suggested methods to arrest the evil.

At these meetings the methods of disposing of our fruit products have formed a part of our programme, and we have strongly advocated that

the growers generally combine and establish a State Fruit Exchange, on a similar basis as the California Fruit Union, which was organized for the marketing of green fruits, at one of our conventions, held in 1885, through which their prepared and dried products be sold and future markets sought. The resolutions passed at these meetings were properly certified to, engrossed, and transmitted to whom addressed. Replies regarding their ultimate action are on file at this office.

In July last, a mass convention of fruit growers was held, under our auspices, in San Francisco, for the purpose of taking immediate action regarding the proposed new tariff on fruit and fruit products, and to furnish to the Congressional Committee detailed statements concerning the different horticultural industries and products and the need of a tariff on said products in accordance with the following resolution:

"Resolved, That the State Convention of Fruit Growers, and those interested in fruit culture, be called to meet in San Francisco about July 15th next, to formulate such information as is desired by the California Representatives in Congress, on the necessity for duties on fruits and fruit products."

The attendance was large and most of the fruit-growing counties were represented. Straight detailed arguments were prepared by the convention and forwarded to each member of Congress from California. Since that time we have continued corresponding with our representatives in Washington, and have furnished them from time to time with all the information they have required in arguing this question before the committee having the framing of the bill in charge.

FORESTRY.

Forestry protection is rapidly gaining ground. The Government seems to be alive to the importance of forest preservation, and is determined to stop the wholesale devastation which has been going on in almost every part of the country. This is gratifying. Our fruit growers have taken an active part in this discussion at all the conventions for many years.

PURE FOOD LEGISLATION.

The Pure Food Bill, pending in the House of Representatives at the last session, did not reach its passage. We forwarded resolutions asking the passage of this bill. It is most unfortunate that no measure nor means can be inaugurated to put a stop forever to the adulteration of every food product.

VAGRANT ACT.

We regret that at the last Legislature no effort was made to amend the Vagrant Act. Farmers and fruit growers in rural districts at times are burdened by a tramping population, who roam the country and keep people in constant fear. Much injury is done, and occasionally serious crimes are committed.

IMITATION OLIVE OIL.

The last Legislature passed a bill, prepared by the Board, to regulate the sale of imitation olive oil. The bill provides that every article, substance, or compound, or oil other than that extracted solely from the

fruit of the olive tree, is declared to be "imitation olive oil," and any person who adulterates or manufactures imitation olive oil must place (under heavy penalty) a label on the can, bottle, or vessel, bearing the words "imitation olive oil," printed thereon in capital letters, in a clear and durable manner, in the English language, in plain type designated and known as twenty-four-point letter type (two-line pica) of a Gothic face; said label shall also state plainly the name and address of the manufacturer or compounder, the name and place where manufactured or put up, and also the names and actual percentages of the different ingredients contained in each bottle, can, or vessel. It also prohibits imitation olive oil to be transported unless marked as such, and also prohibits oil bearing the semblance of olive oil, manufactured out of the State, to be sold under the representation that it is manufactured in this State; and makes it a misdemeanor to offer for sale any such oil upon the receptacle of which is any cut, design, or mark intended to convey the belief that such is manufactured in this State. (Statutes of California, 1893, pp. 210-211.)

TAXING TREES AND VINES.

The Legislature, at its last session, also passed the following constitutional amendment (No. 7), which is to be voted on at the coming general election in November, 1894, to which the attention of fruit growers in general is called:

"A resolution proposing an amendment to the Constitution of the State of California, by adding a new section to article thirteen of said Constitution, to be numbered section twelve and three fourths (12¾), relating to revenue and taxation. (Adopted March 3, 1893.)

"*Resolved by the Assembly, and the Senate concurring*, That the Legislature of the State of California, at its thirteenth session, commencing on the second day of January, eighteen hundred and ninety-three, two thirds of all the members elected to each house of said Legislature voting in favor thereof, hereby propose that article thirteen of said Constitution be amended by adding to said article a new section, to be numbered section twelve and three fourths, to read as follows:

"**Sec. 12¾.** Fruit and nut bearing trees under the age of four years from the time of planting in orchard form, and grapevines under the age of three years from the time of planting in vineyard form, shall be exempt from taxation, and nothing in this article shall be construed as subjecting such trees and grapevines to taxation."

We especially call attention to this matter, because it is of great importance, and which is becoming an obstacle in fruit growing in California. Heretofore trees have been taxed as improvements. Bare land is taxed at its real value, and its value is not enhanced materially as long as it remains unplanted. As soon as it is set out to fruits, its value necessarily increases, and thus aids in the enhancement of the State's wealth. Under the existing conditions the trees planted on said land become taxable property. They are taxed in addition to the value of the land. They are taxed before they give any return to the owner. In other words, it is taxing unproductive orchards.

This State could better afford to pay a bonus to people setting out young orchards than to force the collection of this unjust tax. To impress the point upon the minds of the people more fully, we herewith append a schedule of valuation which has been fixed:

Fruit trees, first year, \$15 per acre; second, \$20; third, \$30; fourth, \$40; fifth, \$50.

Citrus trees, first year, \$50 per acre; second, \$75; third, \$100; fourth, \$125; fifth, \$150; sixth, \$200; seventh, \$225; eighth, \$250; ninth,

\$275; tenth, \$300; eleventh, \$325; twelfth, \$350; thirteenth, \$375; fourteenth, \$400.

Vines, first year, \$15 per acre; second, \$20; third, \$35; fourth, \$40; fifth, \$50.

Horticulture is a business that should receive every encouragement, instead of its progress being blocked by such an unjust tax. In other countries a bonus for every acre set out to fruit is paid by the government. Thus the importance of horticulture is apparent, and the bonus offered stimulates new plantings. It is conceded that horticulture aids in the development of the State and enhances its wealth; then why not encourage the industry that makes it so?

INVESTIGATIONS.

During the year several bulletins, giving the results of investigations carried on by the Board, have been published; others are now in course of preparation.

PARASITES AND BENEFICIAL INSECTS.

The Legislature of 1891 passed an Act entitled "An Act to appropriate \$5,000, for the purpose of sending an expert to Australia, New Zealand, and adjacent countries, to collect and import into this State parasites and predaceous insects," approved March 31, 1891, and confided to our care the expenditure of said money. As soon as the Act became a law, we entered into an agreement with the late Secretary of Agriculture, J. M. Rusk, whereby we secured the services of Albert Koebele, an accredited agent of that Department, and who on a former mission discovered the *Vedalia cardinalis*, which achieved such wonderful results in ridding our citrus orchards of that formidable pest, the cottony cushion scale, which for a time threatened their very existence. Secretary Rusk, at our request, sent Mr. Koebele on this late mission and paid his salary, while we paid his expenses. He sailed for Australia on August 20, 1891, where he remained about a year, traveling from one country to another searching for parasites and beneficial insects. The following constitute the different species he there collected and sent to this State for propagation:

Coccinella arcuata, Fabr.
Coccinella conformis, Boisd.
Coccinella antipodum, White.
Coccinella Kingi, MacLeay.
Coccinella repanda, Thunb.
Neda testudinari, Muls.
Halzia gailbula, Muls.
Halzia poseoi, Crotch.
Halzia edwardsi, Muls.
Verania frenata, Er.
Verania lineola, Fabr.
Orcus chalybeus, Boisd.
Orcus australasia, Boisd.
Orcus nummularis, Boisd.
Orcus bilunulatus, Boisd.
Trichorcus cinctus, Blackb.
Anisorcus affinis, Crotch.
Chryptolemus montrouzieri, Muls.
Boculus fourneti, Muls.
Boculus convexus, Blackb.
Platygomus lividigaster, Muls.
Novius Koebelei, Olliff.
Novius bellus, Blackb.

Scymnus whittonensis, Blackb.
Scymnus queenslandicus, Blackb.
Scymnus australasiae, Blackb.
Rhizobius boucardi, Crotch.
Rhizobius ventralis, Erich.
Rhizobius debilis, Blackb.
Rhizobius satellus, Blackb.
Rhizobius fugax, Blackb.
Rhizobius dorsalis, Blackb.
Rhizobius cyaneus, Blackb.
Rhizobius speculifer, Blackb.
Rhizobius toowoombae, Blackb.
Rhizobius aurantii, Blackb.
Rhizobius cæcus, Blackb.
Rhizobius (hirtellus), Crotch?
Rhizobius pulcher, Blackb.
Rhizobius australis, Blackb.
Midus pygmaeus, Blackb.
Lipernes subviridis, Blackb.
Gymnoscyrmnus minutus, Blackb.
Cyrema nigellum, Blackb.
Serangium hirtuosum, Blackb.
Serangium maculigerum, Blackb.

Erithionyz lanosus, Blackb.
Scymnodos Koebelei, Blackb.
Scymnus notescens, Blackb.
Scymnus flavifrons, Blackb.
Scymnus Sydneyensis, Blackb.

Thalpoohares cocciphaga, Meyr. *Thalpo-*
chares sp., and three other Tineids.
Diplois Koebelei, Skuse, M.S.
Lestophonus icerys, Skuse.

Besides the above, many other as yet undescribed species were received from him. Some of them give great promise of ridding the orchards of this State of some of the most formidable pests that attack them. The *Orcus chalybeus*, at Los Angeles, increased to such an extent that an agent had to be appointed to prevent them from being carried away by curiosity-seekers and others, perhaps too enthusiastic of the ultimate results of same as scale destroyers, thereby lessening their numbers and preventing reproduction of the species for colonization. The *Rhizobius ventralis*, an insect preying on the black scale, has increased to many millions, from not more than twenty insects. It is now an established fact that they are equally as important for the destruction of the black scale as the *Vedalia cardinalis* proved for the cottony cushion scale. While the latter scale confined its attacks to citrus trees principally, the black scale attacks almost every tree and plant known; and while it does not thrive in sections where the air is dry and the heat of summer ranges above 90° F., along the coast and bay counties it has been one of the most troublesome pests the fruit raisers have had to combat. The functions of the *Vedalia cardinalis* and the work it has accomplished were without precedent, and for this reason entomologists claimed a repetition of it in the case of the recently imported species would be impossible. That the work the *Vedalia* accomplished was without precedent is true, but in the recently imported species, two of them—*Rhizobius ventralis* and *Novius Koebelei*—also proved their value as scale destroyers, and in that respect equaled the *Vedalia* and thus showed the wide field that lies open for future investigation in this line. The *Novius* preys on the cottony cushion scale, and while we already have an enemy for this scale in the *Vedalia*, it cannot but prove a valuable ally. The *Rhizobius ventralis* promises to be of more importance, because it attacks all the scales of the *Lecanium* family, of which there are many infecting our orchards. The *Rhizobius ventralis* was received in June, 1892, and placed in an orchard in Santa Barbara, infested with black scale. In September of that year their increase began to be noticed, but this increase was necessarily slow, as the original stock consisted of only about twenty insects. In the spring of 1893 their increase was noted at a greater ratio, and by summer they had increased to many millions, and destroyed the scale on the trees wherever they were placed. So complete was their work and so satisfactory, that in September the distribution of colonies began. Their distribution was discontinued on October 16th, after having sent out 453 colonies of from 25 to 50 beetles each. Other distributions will be made in the spring of 1894. There are now more than five hundred applications on file. Those distributed were as follows:

REPORT OF STATE BOARD OF HORTICULTURE.

Alameda.....	1	Lamanda Park.....	6	San Diego.....	14
Alhambra.....	12	La Mesa.....	1	San Dimas.....	3
Anaheim.....	8	Linda Vista.....	1	San Francisco.....	8
Azusa.....	10	Livermore.....	1	San Gabriel.....	17
Ballard.....	1	Long Beach.....	1	San José.....	5
Berkeley.....	1	Los Angeles.....	67	San Leandro.....	1
Buena Park.....	2	Martinez.....	1	San Lorenzo.....	1
Cahuenga.....	1	Mission San José.....	1	San Luis Obispo.....	3
Calistoga.....	1	Monrovia.....	1	San Rafael.....	2
Carpenteria.....	3	Montecito.....	4	Santa Ana.....	5
Centerville.....	3	Monterey.....	1	Santa Barbara.....	37
Chula Vista.....	2	Mountain View.....	2	Santa Clara.....	4
Claremont.....	1	Napa.....	1	Santa Cruz.....	8
Colegrove.....	4	National City.....	6	Santa Maria.....	5
College City.....	1	New Jerusalem.....	1	Santa Monica.....	6
Colton.....	1	Niles.....	5	Santa Paula.....	4
Compton.....	1	Nordhoff.....	2	Saticoy.....	5
Covina.....	16	Occidental.....	1	Sespe.....	1
Del Mar.....	1	Oceanside.....	1	Sierra Madre.....	4
Downey.....	3	Olive.....	2	St Helena.....	1
Duarte.....	6	Ontario.....	26	Summerland.....	1
El Modena.....	1	Orange.....	3	Suñol.....	1
Fairview.....	1	Pala.....	2	Sunnyside.....	1
Fallbrook.....	4	Pasadena.....	11	Trenton.....	1
Fillmore.....	5	Piru.....	2	Tropico.....	2
Fullerton.....	3	Placerville.....	1	Tustin.....	4
Glendale.....	1	Pomona.....	19	Twin Oaks.....	1
Goleta.....	4	Prospect Flat.....	1	Ventura.....	6
Grass Valley.....	1	Puente.....	1	Verdugo.....	2
Haywards.....	1	Rainbow.....	1	Vernondale.....	4
Helena.....	1	Rivera.....	7	Villa Park.....	1
Helix.....	1	Riverside.....	4	Whittier.....	2
Hollister.....	1	Sacramento.....	1	Yorba.....	1
Jamul.....	1	San Bernardino.....	3		

The cost of this investigation was but a trifle in comparison with the value these insects will eventually prove to the State.

The following are the expenditures incurred; all vouchers and itemized bills are on file in the office of the State Controller:

1891—Oct. 31—Voucher No. 1.....	\$395 25
Oct. 31—Voucher No. 2.....	380 68
Nov. 30—Voucher No. 3.....	313 43
Dec. 28—Voucher No. 4.....	236 87
1892—Jan. 25—Voucher No. 5.....	297 54
Feb. 29—Voucher No. 6.....	312 00
Mar. 21—Voucher No. 7.....	297 47
Apr. 25—Voucher No. 8.....	365 52
Aug. 4—Voucher No. 9.....	918 12
Sept. 26—Voucher No. 10.....	131 65
Cost of transmitting funds:	
Voucher No. 11.....	24 75
Voucher No. 12.....	10 00
Voucher No. 13.....	15 00
Voucher No. 14.....	13 90
Cost of illustrating report—Voucher No. 15.....	625 00
Total.....	\$4,337 18
Balance unexpended.....	662 82

This amount (balance) has been returned to the State Treasurer, as is shown by certificate (No. 163) from Controller's office.

The report on this mission, made to the Board by Albert Koebele, was published in pamphlet form in December, 1892, of which ten thousand copies were printed. Said report also appears in the proceedings of the San José Convention in this volume. An extra set of the colored plate illustrating some of the species in the pamphlet was ordered printed and appears in the present report, as also cuts illustrating the *Rhizobius ventralis* in various stages, and an extra plate of our most common species, as well as those of former introduction.

The following is a supplemental report by Mr. Koebele:

To the honorable State Board of Horticulture:

GENTLEMEN: My expenses on my first trip to Australia were light and less than on my last trip, for the following reasons: My work of the first trip consisted only in searching for and introducing the natural enemies of the *Icerya purchasi*, which were found in numbers in and near cities. During the most of my time then I remained at Adelaide, at which place the chief work had to be done, and there I stayed at a private boarding-house. As a Commissioner for the Melbourne Exposition, I had free passes over the roads of New South Wales, Victoria, and South Australia during the entire time of my work, consisting of four months. Many of the items, such as cab fare, etc., were not allowed by the regulations of the Commissioners, and the same were paid out of my private funds. The expenses for the last trip were necessarily heavier, for this reason: I went on my second mission to study and collect such parasitic and predaceous insects as would be of benefit to the fruit growers here. I distinctly understood from you that nothing should be left undone to make the work a success, regardless of expense. It became necessary to visit all parts accessible, and all beneficial insects had to be bred to become properly familiar with their habits and natural enemies, in consequence of which I had to keep a room in which to do this work, at an extra expense. During a great part of the time I was unable to get my meals at the hotel at which I stayed and paid for same, on account of the pressing work. It was generally at long distances from the railroad stations that the field work and collecting had to be done; and in order to save time and health, cab hire had to be resorted to. Without the necessary conveniences and proper living it would have been impossible for me to have done the work accomplished.

Yours respectfully,

ALBERT KOEBELE.

ALAMEDA, CAL., November 9, 1893.

Our agent while traveling abroad was well received everywhere, and great kindness shown him, for which we feel grateful. In turn we have aided those countries in every way possible.

INTRODUCTION OF THE VEDALIA INTO SOUTH AFRICA.

We supplied the government of South Africa with colonies of *Vedalia*, which in a few months cleaned out the cottony cushion scale in the orchards, thereby doing for the Cape what Australia did for us a few years ago, in giving us the *Vedalia*, which saved the citrus industry from ruin by that formidable pest.

The following extracts from Mr. Louw's report on his California mission will no doubt prove of interest:

SIR: In order to carry out the instructions contained in your letter to me dated September 18, 1891, I left for the United States on the same date in the "Moor," and arrived at New York on the morning of November 6, 1891.

"To the Honorable J. W. SAUER, Colonial Secretary:

"Your instructions to me were:

"First—To obtain a supply of the California beetle, called the *Vedalia cardinalis*." ***

I left for California, touching en route and stopping at Philadelphia, Chicago, and Denver, and arrived at San Francisco on November 24th.

On the morning of the 25th I went to see Mr. B. M. Lelong, the Secretary of the State Board of Horticulture, and was surprised to find, upon my mentioning the *Vedalia* to him, that he could immediately supply me with a colony, and more should I require it.

The State Board of Horticulture keep in their offices at San Francisco a regular stock of *Vedalia*, and also propagate them there, and they supply the various demands to the State and elsewhere. I then made arrangements with the Secretary to forward by express for New York one box containing the *Vedalia*, and another box containing a supply of food, for my journey homeward, upon his receiving a telegram from me from Los Angeles, which place I had to visit.

I left San Francisco on December 6th, and arrived at Los Angeles on the evening of the 7th. * * *

Having now obtained the supply of *Vedalia*, I fixed upon the 23d of December as the date of my departure from New York, and I wired to Mr. Lelong at San Francisco to that effect, in order to enable him to forward me his supply of *Vedalia*, as promised, in time, which he did.

With a supply of living scale carefully packed in a separate box, under the direction of Mr. Lelong, I was enabled during the voyage home, which extended to about thirty-five days, to feed both the boxes of *Vedalia*, and with careful management on the 29th

of January, 1892, succeeded in handing them over to the Secretary of the Agricultural Department here in a perfect condition.

I trust that as my mission in this respect has been crowned with success, the Colony may within a very limited time reap the benefit of it.

Mr. Louw reports extensively upon many other investigations made by him, and concludes his report as follows:

I desire especially to mention the National Agricultural Department at Washington, and Mr. B. M. Lelong, the Secretary of the State Board of Horticulture, at San Francisco, Cal.; to both above mentioned I desire you will, on behalf of our Government, express to them your appreciation of the services rendered to me.

THOMAS A. J. LOUW.

MALMESBURY, 1st February, 1892.

INSPECTION OF STEAMSHIPS.

As new insects are continually appearing, also fungi not before observed, in different countries, and trees from those countries are being imported every year into our State, and as the inroads already made by these enemies to fruit culture there are a serious loss to the growers and have made it almost impossible for them to continue the business, we have caused the inspection of every steamship arriving from foreign countries, to prevent their possible introduction into this State. The following list comprises the number of vessels arriving at the port of San Francisco inspected during the year, upon which trees and plants were found:

Date.	Vessel.	From Where.	No. Plants on Board.	No. Trees.	Action Taken.
1893.					
Jan. 5	Columbia			35 bundles	Passed.
Jan. 9	Rio de Janeiro	China and Japan	1 case	40	Destroyed.
Jan. 11	Australia	Honolulu	2 cases		Passed.
Jan. 12	Gaelic	China and Japan	31 cases	2,525	Disinfected.
Jan. 13	Oregon	Oregon		4 bundles	Passed.
Jan. 13	Panama	Central America	1 box	1 bundle	Passed.
Jan. 19	Mariposa	Australia	1 case		Passed.
Feb. 1	China	China and Japan	33 cases, 2-490 plants.	710	119 destroyed, rest passed.
Feb. 6	City of Peking	China and Japan	14 cases, 2-340 plants.		Disinfected.
Feb. 9	Australia	Honolulu	2 cases		Passed.
Feb. 15	City of Panama	Central America	1 case		Passed.
Feb. 15	Queen	Oregon		8 bundles	Passed.
Feb. 17	Monowai	Australia	1 case		Passed.
Feb. 18	Belgic	China and Japan	28 cases, 40,000 plants.	5,000	240 destroyed, rest disinfected.
Mar. 4	Oceanic	China and Japan	44 cases, 11,145 plants.	5,750	350 destroyed, rest disinfected.
Mar. 6	City of Sydney	Central America	1 case		Passed.
Mar. 8	Australia	Honolulu	3 cases		Passed.
Mar. 15	Rio de Janeiro	China and Japan	17 cases, 950 plants.	1,000	200 destroyed, rest disinfected.
Mar. 16	Alameda	Australia	8 cases		Passed.
Mar. 23	Gaelic	China and Japan	Plants and trees for World's Fair.		Passed.
Mar. 24	San Juan	Central America	1 case		Passed.
Mar. 23	P. C. Steamer	Japan	78 cases		Disinfected.
Apr. 5	Australia	Honolulu	1 case		Passed.
Apr. 14	Mariposa	Australia	5 cases		Disinfected.
Apr. 15	China	China and Japan	14 cases		Disinfected.
Apr. 22	Belgic	China and Japan	60 cases		Disinfected.
Apr. 24	City of Sydney	Central America	1 case		Passed.

REPORT OF THE BOARD.

9

Date.	Vessel.	From Where.	No. Plants on Board.	No. Trees.	Action Taken.
May 2	Peru	China and Japan	7 cases, 1-215 plants.	.....	Passed.
May 3	Australia	Honolulu	Few ferns .....	.....	Passed.
May 4	Harvester	Honolulu	50 tree ferns .....	.....	Passed.
May 4	San Blas	Central America.	4 palms .....	.....	Passed.
May 6	Acapulco	Central America.	A few caladiums, etc.	.....	Passed.
May 15	San Juan	Central America.	1 case banana plants.	.....	Passed.
May 16	Oceanic	China and Japan.	1 case .....	.....	Destroyed.
May 20	Rio de Janeiro..	China and Japan.	A few conifer plants.	.....	Clean.
May 25	City of New York	Central America.	A few ornamental plants.	.....	Clean.
May 31	Australia	Honolulu	Few plants .....	.....	Destroyed.
June 6	Gaelic	China and Japan.	.....	2 packages orange trees.	Destroyed.
June 8	Alameda	Australia	1 case ferns .....	.....	Clean.
June 18	City of Peking..	China and Japan.	1 case .....	.....	Disinfected.
June 26	China	China and Japan.	11 cases .....	.....	9 destroyed, rest disinfected.
June 28	Australia	Honolulu	1 box plants	1 box banana plants.	Plants destroyed; banana plants clean.
July 5	Belgic.	China and Japan.	1 case plants .....	.....	Clean.
July 6	Mariposa	Australia	5 cases ferns, etc.	.....	Clean.
July 8	City of Papette..	Tahiti	Few cocoanut trees.	.....	Clean.
July 15	Peru	China and Japan.	1 basket of plants.	.....	Clean.
July 24	San Juan	Central America.	1 cocoa tree .....	.....	Clean.
July 25	Oceanic	China and Japan.	1 case conifer.	.....	Clean.
July 26	Australia	Honolulu	Passengers had a few trees.	.....	Clean.
Aug. 2	Rio de Janeiro..	China and Japan.	Passengers had a few trees.	.....	6 destroyed.
Aug. 4	Monowai	Australia	1 case plants	Flying fox	Plants disinfected; flying fox killed.
Aug. 15	Gaelic	China and Japan.	1 case .....	.....	1 plant destroyed.
Aug. 23	Australia	Honolulu .....	.....	1 case banana plants.	Clean.
Aug. 23	City of Peking..	China and Japan.	Few plants .....	.....	Clean.
Aug. 31	China	China and Japan.	Few plants .....	.....	Clean.
Aug. 31	Alameda	Australia	3 cases .....	.....	Disinfected.
Sept. 9	Belgic	China and Japan.	Passengers had a few plants.	.....	Clean.
Sept. 11	Tropic Bird.....	Tahiti	1 case bulbs .....	.....	.....
Sept. 15	Newbern	Mexico	1,157 boxes oranges.	.....	110 boxes destroyed; rest fumigated.
Sept. 19	Peru	China and Japan.	Few plants .....	.....	Clean.
Sept. 20	Australia	Honolulu	6 plants .....	.....	1 destroyed.
Sept. 28	Colima	Central America.	1 case palms .....	.....	Clean.
Sept. 28	Mariposa	Australia	4 cases .....	.....	Disinfected.
Oct. 4	Oceanic	China and Japan.	A few plants .....	.....	Clean.
Oct. 10	Rio de Janeiro..	China and Japan.	Few plants; 4 flying foxes	.....	Plants clean; foxes killed.
Oct. 12	San José	Central America.	A few palms .....	.....	Clean.
Oct. 16	City of New York	China and Japan.	3 sago palms .....	.....	Clean.
Oct. 17	Acapulco	Central America.	5 cocoanut plants.	.....	Clean.
Oct. 18	Australia	Honolulu .....	.....	3 bxs. pine-apple and banana plants.	Clean.

Date.	Vessel.	From Where.	No. Plants on Board.	No. Trees.	Action Taken.
Oct. 24	Gaelic	China and Japan.	2 cases	3 cases	250 fruit trees destroyed; rest disinfected.
Oct. 27	Monowai	Australia	1 case .....	.....	Disinfected.
Oct. 28	Colon	Central America.	1 cocoanut palm.	.....	Clean.
Nov. 2	City of Peking..	China and Japan.	4 cases plnts for Mexico	.....	.....
Nov. 13	China	China and Japan.	3 cases palms	.....	Clean.
Nov. 18	Australia	Honolulu	3 bxs. plants	.....	Destroyed.
Nov. 19	Belgie	China and Japan.	.....	.....	.....
Nov. 23	Alameda	Australia	1 case ferns	.....	Clean.
Nov. 29	Peru	China and Japan.	2 cases .....	.....	Passed.
Dec. 6	Tropic Bird	Tahiti	A few cocoanut palms.	.....	Clean.
Dec. 13	Oceanic	China and Japan.	25 cases plants.	.....	Disinfected.
Dec. 15	Australia	Honolulu	Palm leaves for Mid-winter Fair	.....	Disinfected.

Total number of vessels on which plants and trees were found, 156. This is only those containing trees and plants, the total number of vessels inspected being over 400.

Besides plants and trees, five flying foxes (vampires), which have proved so destructive to fruit in Australia, were found and killed. The flying fox has proved such a menace to fruit culture there that all sorts of means have been employed for their extermination, but as yet without avail. A cut of same is herewith attached (Plate IV).

The Southern Pacific Company, and Wells, Fargo & Co., notify this office of the arrival of trees and plants, at their different stations and offices, and have instructed their agents not to deliver them to the owners until inspected by our officers.

EXPENDITURES.

The following report shows the amount of work transacted by this Board and the condition of its affairs, as well as to what purpose the funds for its use have been expended, viz:

Your Executive Committee met April 27, 1893. The first examination was of all vouchers which have been received, and which were on file from our last report. We compared each one separately with the entries upon the books, and found them absolutely accurate, without a mistake. Subsequently, we took each bill and compared it with the entries in the day book; there we found every item accounted for. Subsequently to that we examined the books and found each separate department classified, and these different accounts coincided to a cent with the report as made by the Secretary, all being verified.

The first department was stenography	\$201 20
Traveling expenses of Commissioners, during the 10 months	460 75
Experimenting, including all appliances, etc.	187 97
Office furniture	284 05
(Which we examined and found correct in detail).	
Papers for the office	22 60
Additions to Library	128 50
Services of Janitor	152 00
Postage	572 40
(For the 10 months past. It was calculated by the Board that the postage would amount to \$105 per month, and instead it has cost \$572 40 for ten months.)	
Cartage	86 51
Freight	26 19
Expressage	101 70

Wood cuts and electrotypes	\$17 75
Lithographing	490 00
Miscellaneous printing	34 25
Office boy	145 00
Salaries of Special Agents	1,671 68
(Which includes all the compilation of the Report of 1892, outside of what was done by the Secretary, and the items were: four and one half months' services of Mr. Isaac, \$675; Mr. Allen's services, two months, \$300; Mr. Hewitt's services, \$480 68, and Mr. Brainard's, \$200, which is outside of the office.)	
Traveling expenses Special Agents (in securing the material for the report)	62 95
Traveling expenses of Quarantine Officer	294 35
Traveling expenses of Deputy Quarantine Officer (Mr. Ehrhorn)	91 05
Traveling expenses of Secretary	196 50
All the copying outside of the office	85 00
Sketches and drawings	894 82
(Which includes frontispiece of last report, two maps, and Mr. Koebele's report.)	
Office supplies	147 20
Sundries	527 25
Rent	1,215 00
Telegrams	31 05
Salary Deputy Quarantine Officer	223 50
Sixteenth Fruit Growers' Convention (including rent of hall, etc.)	204 00
Repairing and improvements in offices	175 40
Making a total of	\$8,690 55
Leaving a balance of	1,309 45

All of which coincides with the report of the Secretary, and completes the report of Executive Committee.

Respectfully submitted.

J. L. MOSHER,
FRANK A. KIMBALL,
ELLWOOD COOPER,
Executive Committee.

The following are the expenditures for the forty-fourth fiscal year ending June 30, 1893:

Stenographer	\$201 20
Traveling expenses Commissioners	628 25
Experimenting	209 67
Office furniture	301 15
Papers	30 40
Library	129 50
Janitor	177 00
Postage	772 50
Cartage	95 63
Freight	28 19
Expressage	108 65
Wood cuts and electrotypes	17 75
Lithographing	490 00
Miscellaneous printing	111 65
Office boy	145 00
Special Agents, salary	1,771 68
Special Agents, traveling expenses	762 95
Quarantine Officer, traveling expenses	324 25
Deputy Quarantine Officer, salary	304 25
Deputy Quarantine Officer, traveling expenses	91 05
Secretary, traveling expenses	279 70
Copying	85 00
Sketches and drawings	403 48
Office supplies	157 05
Sundries	340 45
Rent	1,620 00
Telegrams	32 85
Expenses Sixteenth Convention (San José)	204 00
Repairing	175 40
Total	\$9,966 21
State appropriation	10,000 00
Balance	\$3 79
Balance from forty-third fiscal year	18
Total balance, June 30, 1893	\$3 97

The expenditures for the present forty-fifth fiscal year, commencing July 1, 1893, to December 30, 1893, are as follows:

Stenographer.....	\$170 00
Traveling expenses Commissioners	129 05
Papers	23 30
Library	51 25
Janitor	95 00
Postage	63 75
Cartage	34 13
Freight	16 18
Wood cuts and electrotypes	260 64
Lithographing	150 00
Miscellaneous printing	105 40
Special Agent, salary	524 50
Special Agent, traveling expenses	87 25
Traveling expenses Quarantine Officer	239 75
Traveling expenses Deputy Quarantine Officer	20 40
Traveling expenses Secretary	127 00
Sketches and drawings	378 64
Office supplies	114 78
Rent	700 00
Telegrams and telephone	71 45
Salary Deputy Quarantine Officer	39 00
Repairing	12 40
Expressage	64 90
Experimenting	114 25
Midwinter Fair exhibit	621 76
Sundries	110 30
Seventeenth State Convention	168 35
Total	\$4,493 43
State appropriation	10,000 00
Balance unexpended	\$5,506 57

To the honorable State Board of Horticulture:

Your Executive Committee has examined the books in full, and find the same correct, and the above report corresponds with the ledger, day book, and vouchers.

J. L. MOSHER,
Chairman.

QUARANTINE REGULATIONS.

(Amended December 28, 1893.)

In order to more properly protect the State from the introduction of formidable pests and diseases, the following regulations were issued:

RULE I. All consignees, agents, or other person or persons shall, within twenty-four (24) hours, notify the Quarantine Officer of the State Board of Horticulture, or a duly commissioned Quarantine Guardian, of the arrival of any trees, plants, buds, cions, seeds, or pits, at any point of debarkation in the State of California.

RULE II. All trees, plants, cuttings, grafts, buds, cions, seeds, or pits imported or brought into the State from any foreign country, or from any of the United States or Territories, are hereby required to be disinfected, as hereinafter provided, upon arrival at any point where they are to be unloaded; and, furthermore, if any of said trees, plants, cuttings, grafts, buds, cions, seeds, or pits are found infested with insects, or with any fungi, blight, or other diseases injurious to fruit or to fruit trees, or to other trees or plants, they shall remain in quarantine fourteen (14) days, or until the Quarantine Officer of the State Board of Horticulture, or a duly commissioned Quarantine Guardian, can determine whether the said trees, plants, cuttings, grafts, buds, cions, seeds, or pits are free from live injurious insect pests or their eggs, larvæ, or pupæ, before they can be offered for sale, gift, distribution, or transportation.

RULE III. All trees, plants, cuttings, grafts, buds, cions, seeds, or pits infested with any insects, fungi, blight, or other diseases known to be injurious to fruit or to fruit trees, or to other trees or plants, and liable to spread contagion, are hereby required to be disinfected before being offered for sale, gift, removal, distribution, or transportation.

RULE IV. All peach, nectarine, apricot, plum, almond, or other trees budded or grafted upon peach stocks or roots, and all peach or other pits, cuttings, buds, or cions, raised or grown in a district where the "Peach Yellows" or the "Peach Rosette" are known to exist, are hereby prohibited from being planted or offered for sale, gift, or distribution within the State of California.

RULE V. All trees, plants, cuttings, grafts, buds, cions, pits, or seeds arriving from any foreign country found infested with insect pests or their eggs, larvæ or pupæ, or with fungi or other disease or diseases hitherto unknown in this State, are hereby prohibited from landing.

RULE VI. Fruit of any kind grown in any foreign country, or in any of the United States or Territories, found infested with any insect or insects, or with any fungi, blight, or other disease or diseases injurious to fruit or to fruit trees, or to other trees or plants, are hereby prohibited from being offered for sale, gift, or distribution within the State.

RULE VII. Transportable material of any kind infested by any insect or insects, or their eggs, larvæ, or pupæ, or by any fungi, blight, or other disease or diseases known to be injurious to fruit or to fruit trees, or to other trees or plants, and liable to spread contagion, is hereby prohibited from being offered for sale, gift, distribution, or transportation, until said material has been disinfected by dipping it in boiling water and allowing it to remain in said boiling water not less than two minutes; such boiling water used as such disinfectant to contain in solution one pound of concentrated potash to each and every ten gallons of water.

RULE VIII. All trees, plants, cuttings, grafts, buds, cions, seeds, or pits may be disinfected by dipping in a solution of three fourths of a pound of whale-oil soap (80 per cent) to each and every gallon of water; said whale-oil soap solution shall be kept at a temperature of 100° to 115° Fahrenheit. Said trees, plants, cuttings, grafts, buds, cions, seeds, or pits shall remain in said solution not less than two minutes. After said trees, plants, cuttings, grafts, buds, cions, seeds, or pits have been disinfected, they shall remain in quarantine fourteen (14) days for subsequent inspection, and if deemed necessary by the Quarantine Officer of the State Board of Horticulture, or a duly commissioned Quarantine Guardian, for further disinfection.

RULE IX. All trees, plants, cuttings, grafts, buds, cions, seeds, or pits may be disinfected by fumigation with hydrocyanic acid gas, as follows: Said trees, plants, cuttings, grafts, buds, cions, seeds, or pits shall be covered with an air-tight tent, or box, and for each and every 100 cubic feet of space therein one ounce of fused cyanide of potassium (68 per cent), one fluid ounce of sulphuric acid, and two fluid ounces of water shall be used. The cyanide of potassium shall be placed in an earthenware vessel, the water poured over the said cyanide of potassium, afterwards adding sulphuric acid, and the tent, or box, to be immediately closed tightly, and allowed to remain closed for not less than forty minutes. After said trees, plants, cuttings, grafts, buds, cions, seeds, or pits have been treated with hydrocyanic acid gas, as above directed, they shall remain in quarantine for fourteen (14) days for subsequent inspection, and if deemed necessary by a member of the State Board of Horticulture, or the Quarantine Officer of said Board, or a duly commissioned Quarantine Guardian, for subsequent disinfection.

RULE X. All trees, plants, cuttings, grafts, buds, cions, seeds, or pits imported or brought into this State shall be inspected upon arrival at first point of debarkation, and if found infested with injurious insects which cannot be destroyed by the remedies required in Rules VIII and IX of these regulations, are hereby prohibited from sale, gift, or distribution, and shall be proceeded against as a nuisance.

RULE XI. Any person or persons having in their possession trees, plants, cuttings, grafts, buds, cions, seeds, or pits infested with any insect or insects, or with any fungi, blight, or other disease or diseases injurious to fruit or to fruit trees, or to other trees or plants, and who refuse or neglect to disinfect the said trees, plants, cuttings, grafts, buds, cions, seeds, or pits, as is required by Rules VIII and IX of these regulations, after having been notified to do so by a member of the State Board of Horticulture, the Quarantine Officer of said Board, or a duly commissioned Quarantine Guardian, the said trees, plants, cuttings, grafts, buds, cions, seeds, or pits shall be declared a public nuisance, and shall be proceeded against as provided by law.

DUSTING SULPHUR MACHINE.

One of the most important inventions made during the year is an apparatus for distributing sulphur on trees, especially where infested by fungus, mildew, or mites. It was invented by George F. Ditzler, Superintendent of the Hatch & Rock orchards at Biggs. An illustration of it and its different parts is herewith attached (Plate V), from which any one can build such an apparatus.

EXHIBIT AT MIDWINTER FAIR.

With a view of showing the people the work this Board has set out to do, we have undertaken to make, at the International Midwinter Fair, which opened in San Francisco January 1, 1894, a collective horticultural exhibit, in its different branches, to which we invite attention. In

this undertaking we have received the cordial support of the fruit growers of our State, which we hereby publicly acknowledge. (See Frontispiece.)

EXPERIMENTS.

Experiments and investigations are constantly being made, the results of which are published in bulletins from time to time, as occasion requires, and widely distributed throughout the State.

OFFICES OF THE BOARD.

The offices of the Board are large and commodious, and are recognized as the headquarters for fruit growers. Here the seekers of information can find the office open every day. We keep on file reports from all horticultural societies of the land, and in addition our library contains books on fruit growing nowhere else to be found. It is the largest horticultural library on the Pacific Coast.

Respectfully submitted.

ELLWOOD COOPER,
L. W. BUCK,
FRANK A. KIMBALL,
J. L. MOSHER,
A. BLOCK,
FRED C. MILES,
SOL. RUNYON,
I. H. THOMAS,
A. F. WHITE,

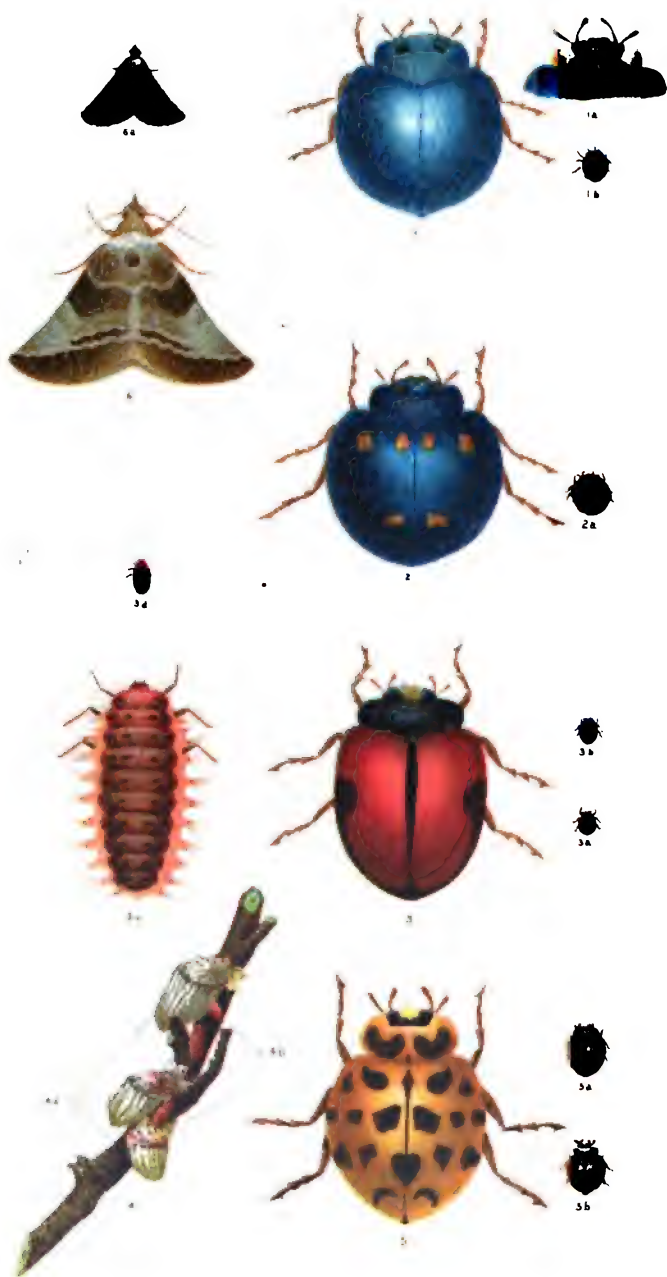
Commissioners.

B. M. LELONG,
Secretary and Chief Horticultural Officer.

Subscribed and sworn to before me, at San Francisco, Cal., December 30, 1893.

[Seal.]

A. K. DAGGETT,
Notary Public in and for the City and County of San Francisco, State of California.



EXPLANATION OF PLATE.

BENEFICIAL INSECTS.

(PLATE I.)

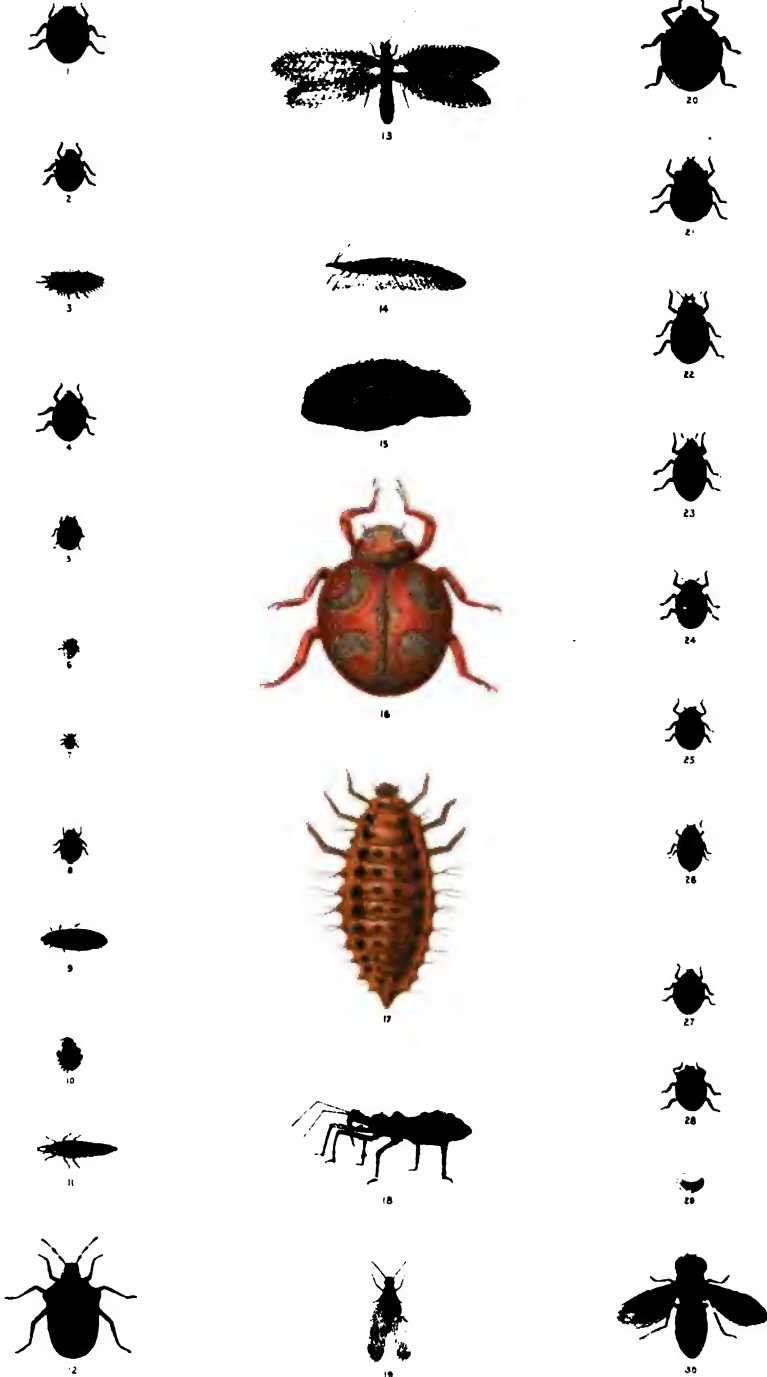
- Fig. 1.** Steel-blue Ladybird (*Orcus chalybeus*)—female, enlarged.
1a. Steel-blue Ladybird—head and prothorax, male, enlarged.
1b. Steel-blue Ladybird—female, natural size.
2. Six-spotted Orcus (*Orcus australasia*)—female, enlarged.
2a. Six-spotted Orcus—female, natural size.
3. Koebele's Ladybird (*Novius Koebelei*)—male, enlarged.
3a. Koebele's Ladybird—male, natural size.
3b. Koebele's Ladybird—female, natural size.
3c. Koebele's Ladybird—larva, enlarged.
3d. Koebele's Ladybird—larva, natural size.
4. Branch with Cottony Cushion Scale and larvæ of *Novius Koebelei*, natural size.
4a. Cottony Cushion Scale (*Icerya purchasi*).
4b. Larvæ of *Novius Koebelei* preying upon Cottony Cushion Scale.
5. 22-Spotted Leis, *Coccinella* (Leis) *conformis*, enlarged.
5a. 22-Spotted Leis—male, natural size.
5b. 22-Spotted Leis—female, natural size.
6. Black Scale Enemy (*Thalpocharus coccophagus*), enlarged.
6a. Black Scale Enemy, natural size.

EXPLANATION OF PLATE.

BENEFICIAL INSECTS.

(PLATE II.)

- Fig. 1. Pilate's Ladybird (*Exochomus Pilatei*).
2. Twice-stabbed Ladybird (*Chilocorus bivulnerus*).
3. Twice-stabbed Ladybird—larva.
4. Eyed Ladybird (*Coccinella oculata*).
5. *Hyperaspis lateralis*.
6. 20-spotted Ladybird (*Psyllobora 20-maculata*).
7. Brown-neck Ladybird (*Rhizobius Toowoombæ*).
8. Australian Ladybird (*Vedalia cardinalis*).
9. Australian Ladybird—larva.
10. Australian Ladybird—pupa.
11. Lace-winged Fly (*Chrysopa Californica*)—larva.
12. Gray Soldier Bug (*Euschistus tristigmus*).
13. Lace-winged Fly (*Chrysopa Californica*)—wings expanded.
14. Lace-winged Fly (*Chrysopa Californica*)—at rest.
15. Lace-winged Fly (*Chrysopa Californica*)—eggs as they are laid at the end of slender threads.
16. Australian Ladybird (*Vedalia cardinalis*)—enlarged.
17. Australian Ladybird (*Vedalia cardinalis*)—larva enlarged.
18. Spine-legged Soldier Bug (*Sinea spinipes*).
19. Brown Laced-wing Fly (*Hemerobius*).
20. *Anatis subvittata*.
21. California Ladybird (*Coccinella Californica*).
22. Convergent Ladybird (*Hippodamia convergens*).
23. Ambiguous Ladybird (*Hippodamia ambigua*).
24. Julian's Banded Ladybird (*Coccinella trifasciata* var. *Juliana*).
25. Blood-red Ladybird (*Coccinella sanguinea*).
26. Striped Ladybird (*Megilla vittigera*).
27. Ashy-gray Ladybird (*Coccinella abdominalis*).
28. Two-spotted Ladybird (*Adalia bipunctata*).
29. Cocoon of the Lace-winged Fly (*Chrysopa Californica*).
30. Syrphus Fly (*Catabomba pyrastræ*).



BENEFICIAL INSECTS.

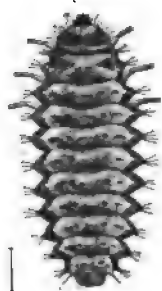




Male, enlarged.

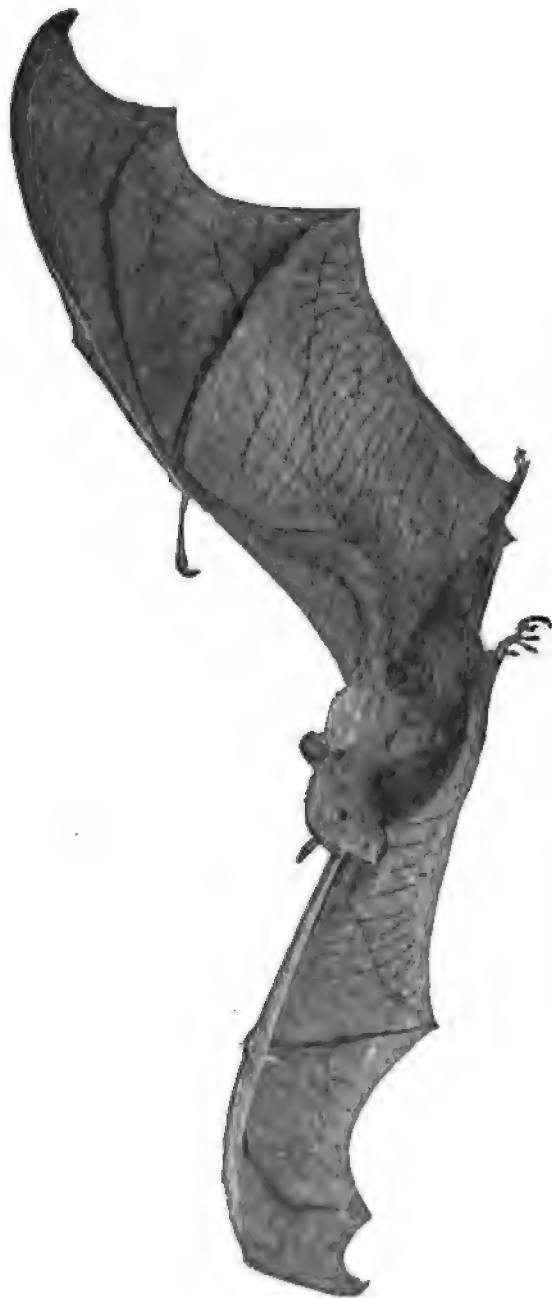


Female, enlarged.

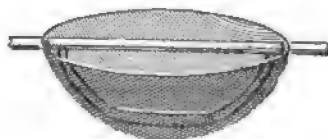
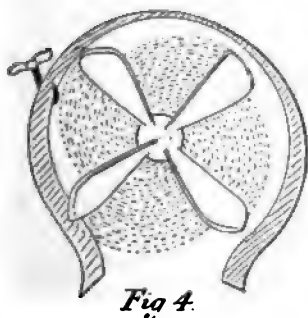
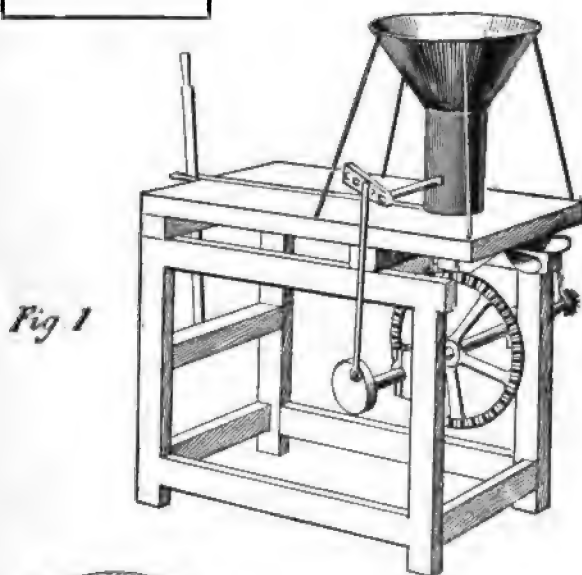
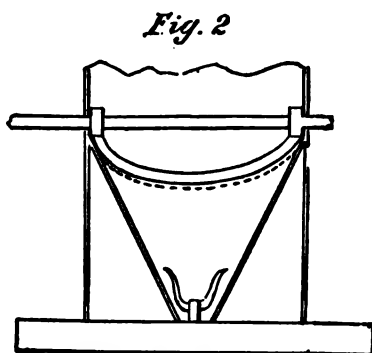
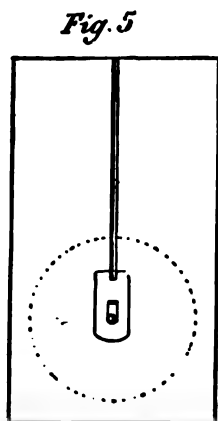


Larva, enlarged.

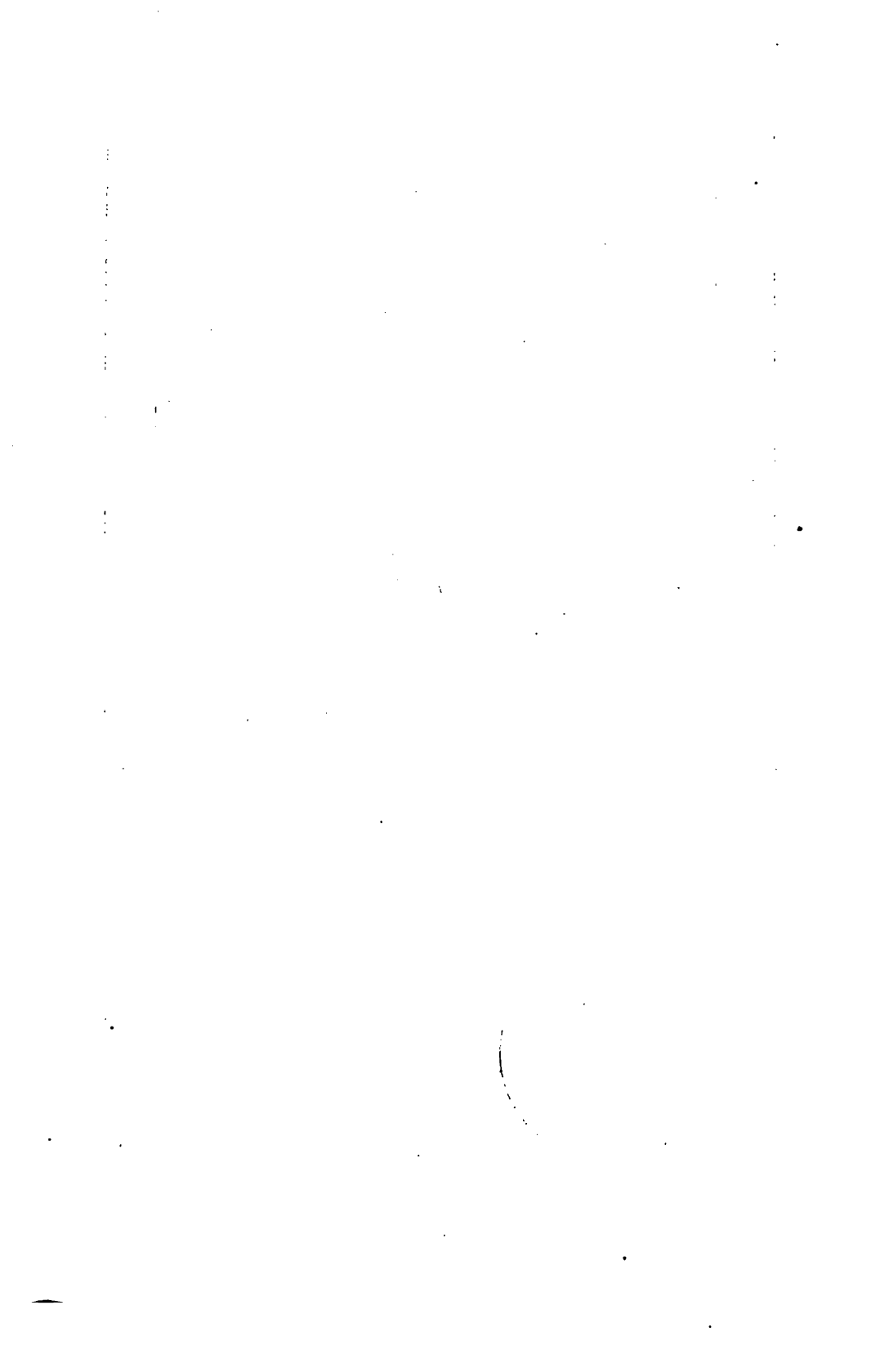
BLACK LADYBIRD (*Rhizobius ventralis*.)



FLYING FOX (*Pteropus*). Spread of wings, 3 feet 2 inches. Length of body, 14 inches.



- Fig. 1. Machine complete.
 Fig. 2. Shows position of screen agitator and funnel.
 Fig. 3. Screen.
 Fig. 4. Movable disk to regulate direction of cast.
 Fig. 5. Slide to regulate quantity of sulphur.



REPORT
OF
B. M. LELONG,

Secretary, and Chief Horticultural Officer.

REPORT OF B. M. LELONG,

Secretary, and Chief Horticultural Officer.

II.

REVIEW OF THE FRUIT SEASON.

The severe financial depression which extended over the length and breadth of the United States during the past season naturally reached the fruit industry of our State, as it did all other industries, although in a much less degree than most others have been affected; and while we have to report a period of depression among our fruit growers, this extends no further than a falling off of their usual profits during the latter part of the season.

Early in the season the canners and driers, who had been dependent upon temporary accommodations from the banks to tide them over their busy season, and until returns from their pack could be realized, found that no money could be had from the bankers. All the financial institutions of the State, dreading the possibilities of runs upon them by their depositors, were calling in all available funds and making no new loans. Owing to this condition of affairs many of our fruit-preserving establishments were compelled to remain closed, while of those which did business the greater part put up but a portion of their usual pack. Of the principal canneries in the State but one half were running at the height of the fruit season, and these were run at one half, or less, their usual capacity. Not more than twenty-five of the fifty larger drying establishments were run, and these put up very much less than their usual pack.

In addition to this conservatism on the part of the banks in our own State, business in the East was demoralized, and jobbers were fearful about placing orders as they had theretofore done, and few contracts were made for future delivery. Eastern houses, which usually lay in their stock of dried fruit early in the season, have neglected to do so this year, owing to the instability of the market and the scarcity of money. This unusual condition of business in the East naturally increased the conservatism of our packers. Less effort was made to force their products on the market, and the fear was ever present that a buyer, when found, might not be responsible, and was liable to be caught in the general crash, in which case the packer and shipper would be the sufferer.

The result of this has been largely to compel the grower to cure his own product, and a very large part of the crop is still in the hands of the producers. This home-dried fruit will find its way to the local and Eastern markets during the year.

To the above-named causes for depression in the prices of fruit must be added the fact that the Eastern crop was unusually large, necessarily reducing the demand for the California product.

Considering all these causes working against the interest of our fruit producers, we may claim that after all it has been a prosperous season, and our orchardists have suffered much less from the financial crash than have those engaged in most other pursuits. Prices paid for green fruit have varied from \$18 to \$25 per ton for drying fruit, and from \$25 to \$35 for canning sizes. Dried fruits have ruled much lower in the market this season. Apricots quoted last season at 12 to 15 cents, have this year sold at 7½ to 10 cents. Peaches, which last year sold at 9 to 12 cents, this year dropped to 6 or 8 cents, and prunes fell from 7 to 4½ cents. Later in the season, however, prices advanced, and a better feeling prevailed in the market. Last season's pack of cured fruits is now exhausted, and the present season's pack has fallen below the usual quantity; and it is not improbable that those who have stock on hand will realize good prices.

There is another reason for supposing this in the changed condition of our fruit market, which the greater part of the growers do not yet comprehend. In the earlier period of our fruit production the yield was comparatively small and could easily be handled by a few speculators, who made contracts for the entire crop early in the season, and the grower realized on his product as soon as it was ready to handle, or even anticipated this. It was within the power and to the interest of the speculator, then, to control the entire output. Now the output is so much in excess of what it was at that period, that there is little danger to be apprehended of a shortage at any time, the speculator cannot readily corner the product, and it is now more to the interest of the jobber to leave the stock in the hands of the producer until there is a market for it. Hence, in the early season there is not so great a demand, and growers who do not fully comprehend the reason, and who have been accustomed to turning their crop into cash at once, become demoralized and are too apt to close out for what they can get, thereby lowering their own market; while those who wait realize good prices. Such is largely the case the present season: those who have held on to their packs are now realizing fair prices, with the market advancing and good prices promised in the near future.

While the limited demand on the part of the canners and driers for green fruit had naturally a very depressing effect on the market, this was not so severe as it would have been had not the growers been able to cure their products by drying. Had the entire output been forced upon an unwilling market, a crash would have resulted, from which it is doubtful whether we should have recovered for many years, if at all. Fortunately our growers had a means of escape, and in their ability to cure their product saved themselves from heavy losses. As the old stock of dried fruit is now well out of hand and comparatively little of the new pack has yet found its way to market, the indications are that better prices will prevail, and those who have held their pack will realize good prices for it.

The packing establishments least affected by the monetary depression were those conducted on the coöperative plan. In these the packer and grower were practically the same person, and he could not be affected, as were those who had to purchase the fruit on speculation and take the chances on an uncertain market for its disposition. The loss to the coöperative packer lies in the difference between the prices received for his furnished product last season and this, and as he will be enabled to

hold his stock until the financial flurry has passed and the market becomes settled once more, it is probable that his loss will be nominal, if, indeed, a reaction does not come which will increase his profits.

With the exception of apricots, which are reported at not over one third to one half of a crop all over the State, the yield of various fruits this year has been above average, and the season a very propitious one.

Cherries generally yielded much more than the usual crop, and being a very early fruit, reached the Eastern and local markets at a time when fruit was in good demand, and netted its growers good prices.

Apricots were light, but those in the early market sold well, and prices kept up until about the middle of August, when they dropped and did not again recover.

Peaches were reported as very heavy in all sections. The early varieties brought good prices—from \$1 25 to \$1 50 per box. Later in the season these prices dropped, and the demand for canning and drying varieties was limited.

The prune crop was very large, and the quality more than usually good. But little of the crop has yet left the hands of the growers, but prices have been fair and are now improving. Altogether the season has been fairly good to the prune grower.

The plum crop was unusually large, and prices for this fruit were good. A heavy demand for Tragedy prunes sprang up and these brought very large figures.

The pear crop was fully up to the average, but prices not so good as usual. Pears and the later peaches came in conflict with the Eastern fruit crop, and the prices received a setback, from which it did not recover during the entire season.

The comparatively small demand for California fruits during the past season has once more revived the old question of over-production, and many suggestions have been made with a view to extending our present markets and opening new ones. I have given especial attention to this subject, and in the course of my investigations as to what extent we are supplying our home market, have prepared the following tables. These show only such fruits and fruit products as are produced in California. In round figures the United States is paying \$16,000,000 annually for fruits that California should produce and supply:

REPORT OF STATE BOARD OF HORTICULTURE.

Value of Fruits Imported in the past Decade and Conflicting with California Products.

Year.	Plums and Prunes.		Figs.		Raisins.		Almonds.		Currants.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
1884	60,800,228	\$2,632,838	7,945,977	\$512,063	53,702,220	\$3,290,150	3,828,104	\$547,619		
1885	57,631,820	2,117,505	7,770,178	510,732	38,319,787	2,661,669	4,732,269	507,946		
1886	64,965,516	2,026,595	7,233,070	505,876	40,387,946	2,865,123	5,822,733	647,077		
1887	92,032,625	2,960,448	8,724,683	487,602	40,673,288	2,281,981	5,422,363	597,478		
1888	70,626,027	2,197,150	10,058,053	469,755	40,476,763	2,070,120	5,747,367	631,748		
1889	46,154,825	1,423,304	10,649,049	482,759	35,091,139	1,736,786	5,545,400	595,227		
1890	59,093,410	1,789,176	10,254,998	456,567	36,914,330	1,997,103	5,715,858	813,278		
1891	34,281,322	2,054,446	9,201,565	697,562	39,572,855	2,018,879	6,812,061	881,007		\$1,246,074
1892	10,849,797	437,271	8,338,759	511,142	20,687,640	984,309	7,629,392	1,029,671	36,665,828	1,209,119
1893	26,214,112	1,162,318	10,503,928	548,946	27,543,563	1,296,342	6,679,147	838,054	33,116,546	1,185,537
Year.	Olive Oil.		Oranges.		Lemons.	Preserved Fruits.	Nuts, other than Almonds.	Unclassified.		
	Gallons.	Value.								
1884	610,429	\$672,552			\$2,698,747	\$585,048	\$687,185	\$2,469,054		
1885	493,928	547,017			2,510,426	770,895	553,991	1,176,136		
1886	634,354	661,580			2,600,819	833,557	563,727	1,450,942		
1887	744,766	662,197			3,835,147	748,488	628,878	1,789,462		
1888	654,162	617,172			3,895,983	941,302	743,668	1,968,758		
1889	893,338	696,065			3,189,534	1,042,846	598,377	1,764,393		
1890	893,984	819,110			3,374,032	954,331	800,376	1,777,298		
1891	605,509	733,489			4,351,970	1,299,137	1,114,959	762,935		
1892	704,486	876,613			2,339,987	1,234,828	821,200	538,300		
1893	697,062	891,424			1,686,455	864,166	51,941	1,239,062		

The articles enumerated in the table, except Zante currants, are dutiable. It is now proposed to remove or reduce the duty on many of them. What the ultimate effect of such action will have upon our fruit interests cannot be foretold, but the prospect is viewed with alarm by our growers, irrespective of party affiliation, and it has already had its effect in preventing the investment of new capital in the fruit industry.

In addition to the above there are some \$9,000,000 annually expended for fruit, nuts, and fruit products, which do not come directly in conflict with California products, and are admitted free of duty. These are chiefly bananas and cocoanuts, and the value of imports under this head for the past ten years is given below:

Value of Fruits not Produced in California Imported in the Past Decade.

Year.	Bananas.	Cocoanuts.	Dates.	Unclassified.
1884	\$1,878,279	\$747,280	-----	\$874,615
1885	2,156,873	714,512	-----	906,655
1886	2,356,843	685,981	-----	881,970
1887	2,682,143	819,271	-----	1,296,245
1888	3,153,654	824,762	-----	1,409,451
1889	3,571,024	782,706	-----	1,597,632
1890	4,653,779	122,810	-----	1,391,081
1891	5,854,752	918,233	\$613,845	1,799,910
1892	5,000,632	917,564	551,629	1,970,634
1893	5,361,187	853,509	493,910	2,133,064

Here are \$25,000,000 expended annually by the United States for imported fruit, the larger part of which should be supplied by California. How to reach the consumers of this fruit and control the market for our own State, is the great problem before us for solution at the present time. This subject has been exhaustively treated by a committee of the State Horticultural Society, whose report to the State Fruit Growers' Convention at Los Angeles appears elsewhere in this report. This shows that there is yet a very large, undeveloped market, which must be reached by our shippers.

In addition to this undeveloped market there is a very large number of people to whom California fruit is as yet an unapproachable luxury, but within whose reach it will be placed by more rapid and cheaper means of transportation, for both of which we may reasonably hope.

The area planted to new orchards in the season of 1893 was fully up to the average. In Southern California the plant of orange trees was less than usual, the low prices received for last year's crop and the very large area in oranges having inspired a feeling of doubt as to the future possibilities in orange growing. A stronger feeling prevailed in favor of lemons, although the severe freeze of the preceding season resulted in cautious planting, and only in those localities in which there was a reasonable assurance of freedom from frost, was the planting very extensive. In such localities, however, very large tracts have been set to lemons, and this branch of the citrus industry gives promise of becoming a very important one. Much interest has been awakened in it by the successful experiments of Mr. Garcelon and other intelligent and successful growers, the result of whose experiences have been published by this Board.

Whatever diminution there was in the planting of citrus fruit trees, was compensated for in the setting out of deciduous fruit orchards, and

the large returns yielded from apricots, peaches, and prunes in 1892 resulted in a boom for those fruits, and very large tracts were set to these in the seven southern counties.

In the counties of the San Joaquin Valley also very extensive plantings of deciduous trees have been made. This is especially true of Tulare and Kings Counties, where an impetus has been given to orchard work of late years by the extraordinary yield, large size, and excellent quality of their deciduous fruits. The comparative freedom of this section from fruit pests and diseases has also greatly encouraged the extension of orchard work.

In the foothill regions of Tulare County, very extensive plantings of citrus fruits have been made, the lemon being largely in favor. This has been brought about by the success which has attended orange and lemon culture at Porterville and elsewhere in the foothills of Tulare County.

Extensive plantings of fruit, both citrus and deciduous, have also been made in Merced County on lands reclaimed by the Crocker-Huffman canal; in Placer County; in Butte County, at Thermalito and Palermo; and in different parts of Tehama County. Besides these there have been large numbers of small orchards set out in all the counties of the State, adding very largely to the orchard area.

For the present season the outlook is not encouraging for much in the line of orchard planting. The causes which have combined to depress the prices of fruit and lessen the demand during the past season, have also had their effect upon prospective plantings, and but few large tracts will be set out this season, and these largely to deciduous fruits.

Very much attention is now being directed to the olive; and the culture of this fruit, and its manufacture into oil and pickles, gives promise of becoming one of the most important industries of our State. This work has been very largely aided by the efforts of this Board and the organization of the olive growers of the State. Numerous inquiries have reached me during the year in regard to the best varieties for planting, conditions required for growth, methods of treatment in the manufacture of oil and pickles, etc., all indicating a great and growing interest being taken in olive culture. Some very large tracts have been planted to this fruit in various parts of the State, and large numbers of small orchards have been set out. California may reasonably hope to supply the demand for olive oil in the United States in a few years, and the strict enforcement of the Act for the prevention of its adulteration will greatly assist in this, as it will give a guarantee to the purchaser that olive oil with a California grower's label is genuine.

Not so much attention has been given to figs. Apparent insuperable difficulties stand in the way of success with this fruit. The black fig, which thrives well, is not marketable, on the account of its color; while the Smyrna has not yet proved successful. The white Adriatic is liable to split and sour before it ripens, and so become unfit for use. For these reasons few people have cared about entering into fig production on a commercial scale, and while some remarkably fine fruit has been packed by some growers, fig culture may still be considered as in the experimental stage, awaiting the discovery that shall overcome the obstacles which at present prevent its success, when we may hope to count this fruit among our many important orchard industries.

While there have been a great many new plantings of prunes in the

past season, a feeling of doubt as to their future has taken hold, and there has not been so large a proportionate area of new land set to prunes this year as in previous seasons. Whether this fear is justified only the future can prove, and this may be determined by showing what sections are especially adapted to the growth of this fruit and what are not, resulting in the destruction of many orchards which have been planted indiscriminately, under the impression that the prune would do well anywhere. California is not alone in her extensive planting of prunes; the whole Pacific Coast is experimenting with them—Oregon, Idaho, and Arizona have all made extensive plantings in the past few years—and if the whole area now planted to prunes proves productive, certainly the output will be so largely increased that a wider market than we now possess will have to be found.

The past year has been productive of great harmony on the part of our fruit growers, resulting in their organization into associations for the purpose of regulating the marketing of their products. The benefits derived from coöperative action have been apparent in the work of the older organizations—the California Fruit Union, the Orange Growers' Union, the Santa Clara Fruit Exchange, and other local organizations—and the action of these bodies has made evident the necessity for an association having a wider scope, and the California Fruit Exchange has been the result. The outcome of this coöperative movement will, without doubt, ultimately be a general organization of the fruit growers of our State for the purpose of extending our markets, guaranteeing our products, and obtaining the best prices possible for our crops, while furnishing them to the consumer at fair rates. The advantages of these organizations are evident. No individual can wield the same influence that an organization can, and the larger that organization the wider its influence. If the fruit growers of our State can be made to work in harmony for their own interests, the great questions of markets and transportation will soon be settled, and all fear of overproduction in any line will vanish.

III.

THE APRICOT.

(*Armeniaca vulgaris*.)

The apricot is a native of Armenia, Arabia, and the highest regions of Central Asia. It is one of the earliest fruits to blossom, and is generally in full flower in February and early March. Success in its culture is by no means certain, for the reason that all varieties do well only in sections adapted to their particular habits of growth and time of flowering. Many varieties that do well along the coast are failures in the interior valleys, and vice versa.

In appearance the apricot is perhaps the handsomest of all stone fruits, and contains less acid. For canning, evaporating, and drying purposes, as well as for use in the fresh state, the fruit can hardly be excelled, and in sections adapted to its culture it is a source of great profit.

The apricot is essentially California's fruit, for here it attains perfection as it does nowhere else in the Union, and we have almost a monop-

oly in its production. In nearly all other kinds of fruit we have to compete with other sections, but not so with this fruit. Our soil, climate, and conditions are peculiarly adapted to the apricot, which is a favorite fruit over a large part of the State, and will thrive in most sections outside of the higher elevations. Its favorite habitat, however, seems to be where the sea breeze reaches it, yet where there is sufficient warmth to encourage its strongest growth. It is a rapid grower and an early bearer, and in the more favored sections has proved itself very profitable.

While a general favorite in many sections of our State, the apricot is worthy of all the confidence it has won, and deserves a front place among the orchard fruits of California. The tree being an early bloomer, late frosts are therefore liable to destroy the orchardist's chances for profits. Locations subject to late frosts should be avoided, as should also low swales, into which the cold air will settle to the detriment of the trees. Situations exposed to the action of the sea breeze are claimed as the most favorable to apricot culture, and the fact that this tree always bends toward the wind, and makes the most vigorous growth on the seaward side, is pointed out as a proof of the correctness of this claim.

PROPAGATION.

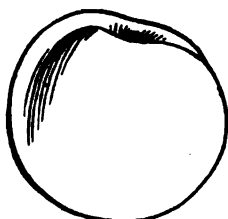
The methods of propagating the apricot are simple, and are effected by seeds, budding, and grafting. Apricot stocks are more brittle than peach, are not as hardy, and also are susceptible to sourness at the root, owing to excessive moisture. For these reasons, the peach stock is better adapted to work the apricot on. Almond stocks are also used, but are not as desirable as the peach. In heavy soils plum roots are used.

Planting Peach Pits.—Peach pits are perhaps the easiest to germinate, and almost any person can make a success of raising seedlings. The best seed, or pits, are from seedling trees, or, as they are termed, "natural fruit;" they are not subject to splitting at the pit, as those from most budded varieties are, and nearly all germinate, and the plants become the most thrifty stocks. The longevity of the tree is dependent, in a great measure, upon the healthy condition of the seed. The union of the two halves of the pits of seedling fruit is very close and tenacious, while in pits of budded fruit is often slight and imperfect. The kernels in pits from natural fruit are generally quite hard, close, and nutty, while in those of budded fruit are often defective, and the two halves frequently separate in handling. The pits should not be allowed to dry after being taken from the fruit; they should immediately be put in sand or layered in the ground, to prevent the germ from drying. There are several methods in use for layering the seed. The most common one is to layer the pits in a well prepared seed-bed in the fall. The place selected should be in soil free from standing water during winter. As the seed is to remain until spring, an excess of moisture will destroy their germinating power. Seed-beds are made from 4 to 8 feet wide, and as long as necessary. The earth is spaded away for a depth of 6 to 8 inches, and the pits spread about 4 to 6 inches thick, and then the earth is spread on top, covering them for 4 to 6 inches. They are allowed to remain there until early spring.

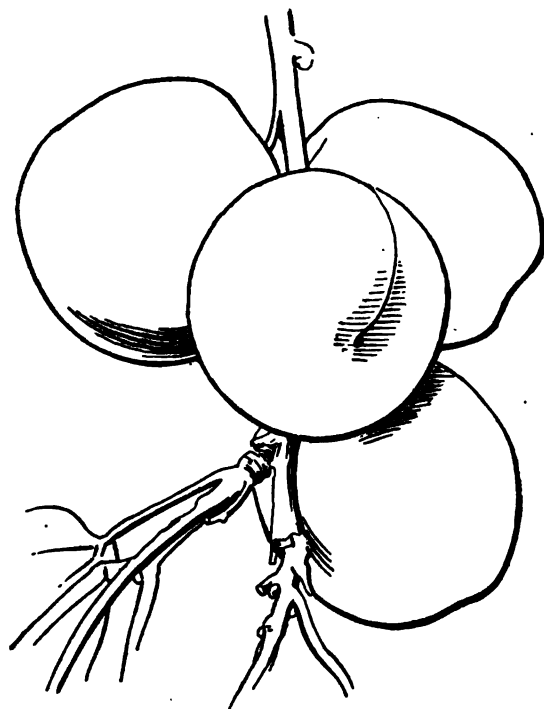
Another method is by spreading the seed thickly about 4 to 6 inches deep, and then spading in about 6 inches deep. This completely mixes the seed, and it is covered in the soil. In either method the seed must

THE APRICOT.

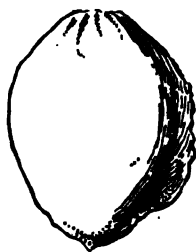
PLATE VI.



1. Pringle.



2. Newcastle.



3. Pit of Newcastle.

remain in the ground until spring, when the shells are so far loosened that in handling they separate from the kernel. The kernels are at that time swollen and many will be found sprouted. They are then ready to be planted in nursery, and care is required in their handling so as not to break the tender roots of those sprouted. The planting of the seed in permanent nursery rows in the fall is also practiced, but is not recommended, as the seed does not come up evenly and prevents the ground from being worked after rains, etc.

The young trees having grown to a suitable size are budded in the summer.

LOCATION FOR APRICOTS.

By George M. Gray, of Chico.

After the rainy winter of four years ago quite a large number of trees died in this part of the State, and again this spring after the continued rain of last winter a great many trees died and many more are not doing well; they are losing here and there a limb, gum is working out of the bark, and they split down much more easily than they did before. I am convinced that one must be very particular in selecting a location for an apricot orchard, a good deal more so than for peaches, pears, or cherries. There should be good drainage, a deep soil, no ditches above that might seep through and reach the roots of the tree, and "last but not least," where there is never more than twenty inches of rainfall in any one winter, and frost does not cut the blossoms.

SOILS FOR THE APRICOT.

A moderately light, sandy loam, well underdrained, is perhaps the best for the apricot. At Campbell's, in Santa Clara County, where this fruit is very extensively grown, the trees do well in a deep gravelly loam, the wash of Los Gatos Creek, in which there is no water within 30 to 40 feet of the surface. Near San José Mr. Holmes has a remarkably fine orchard. This yields large returns, sure crops, and excellent fruit. The soil is well underdrained, however. While the apricot may do well in such soil, its favorite is a lighter loam, and the superior ease of working such is an extra inducement in the selection of lighter soils for the apricot orchard.

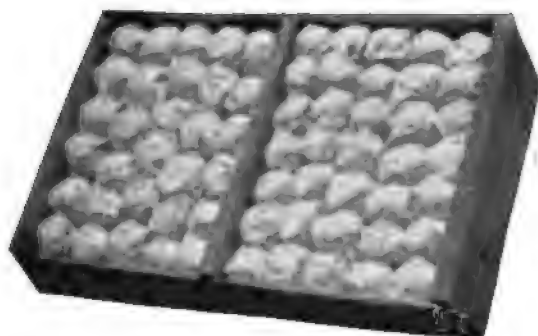
By Judge W. C. Blackwood, of Haywards.

A moderately moist loam is the best for the growth of the apricot. Too much moisture is ruinous. A clay soil is not good. The tree seems to thrive best where it has a moderate exposure to the ocean breezes and genial warmth of temperature; hence, the wonderful success which has attended its culture around the bay of San Francisco and coast counties farther south. Its cultivation has never been successful in the Atlantic States, and it does not succeed very well in many of the interior counties of our own State. The climate of the interior seems to be too dry and hot, and if artificial irrigation is resorted to there the gum disease develops, and the fruit when ripe is watery and deficient in richness.

The general rules laid down for the preparation of the land for the orchard apply especially to the apricot, and the soil should be thoroughly prepared by deep plowing, cross plowing, and sub-soiling, and where possible should be left exposed to atmospheric action for some months before the trees are planted. It is a safe rule that land intended for orchard cannot be worked too much or too thoroughly.

PLANTING.

The best time for planting the apricot is in January and February. The tree at this time is entirely dormant, and the best results are obtained. The young trees should be carefully removed from the nur-



BOX OF APRICOTS.

The above illustration shows a box of apricots properly packed for shipment, each fruit being wrapped in paper.

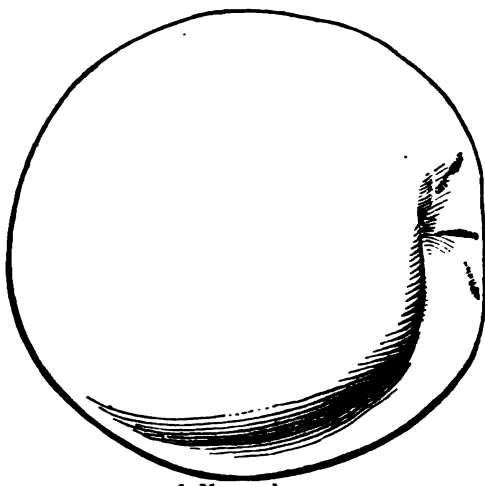


BASKET OF PEACH APRICOTS.

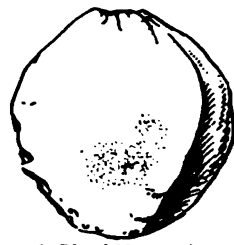
The above illustration shows a basket of apricots properly packed for shipment. In this method a layer of paper is placed between each layer of fruit, and the baskets are arranged in crates.

THE APRICOT.

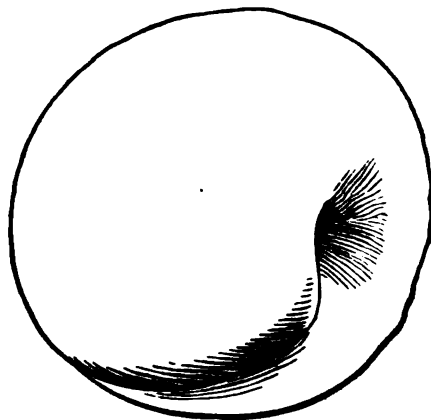
PLATE VII.



1. Moorpark.



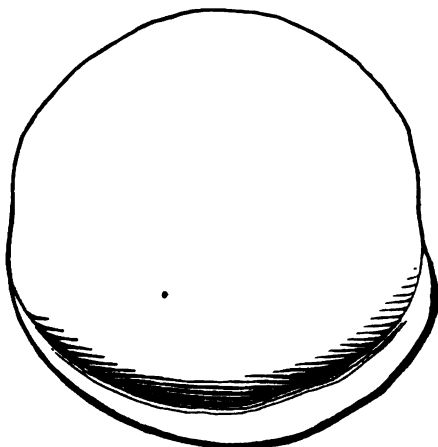
2. Pit of Moorpark.



3. Royal.



4. Pit of Royal.



SH

5. Blenheim.



6. Pit of Blenheim.

sery row, care being taken to preserve as many roots as possible. Those bruised or broken should be cut off with a sharp knife, making a clean cut. Holes of ample size should be prepared for their reception, and the bottom soil should be thoroughly pulverized. The trees should be planted at the same depth and same exposure in which they stood in the nursery row. The roots should be spread out, and the soil carefully filled in around them and well packed down. When in position the top should be removed, and a stem of 6 to 12 inches left for the future tree. The apricot is a vigorous grower, and makes a very large top. It therefore requires an abundance of room. The trees should be set at not less than 24 feet apart, and many growers recommend 30 and 35 feet as preferable.

In planting, trees one year from the bud are preferable to those of greater age, although many growers advocate the planting of dormant buds, claiming that these in a few years will surpass in growth the one-year-olds from the nursery, but require considerable attention the first year.

PRUNING.

In pruning the apricot, skill and judgment should be exercised. It should be borne in mind that we are forming a tree that is to last for a generation, and perhaps several, and that the greater part of this work is to be done in the first three years of its orchard life; that these three years' care will decide whether the tree shall be a success or a failure, whether it shall be a source of pleasure and profit to its owner, or a source of anxiety and care. The tendency of the tree is to overgrow; it runs largely to top, and the winds break the limbs and ruin the symmetry of the tree.

The objects to be attained in pruning are strength of limbs to bear their load of fruit, sufficient new wood to insure abundant fruit without overcrowding, and excellence of fruit. To accomplish this the young limbs should be so trained as to give them the greatest bearing power, and to this end the tree should be headed low and the branches given an oblique upward direction. The limbs should be at different heights on the trunk and evenly balanced on all sides. Avoid forks, which are liable to split when the tree is large. Such pruning makes a symmetrical tree and distributes its load equally on the trunk.

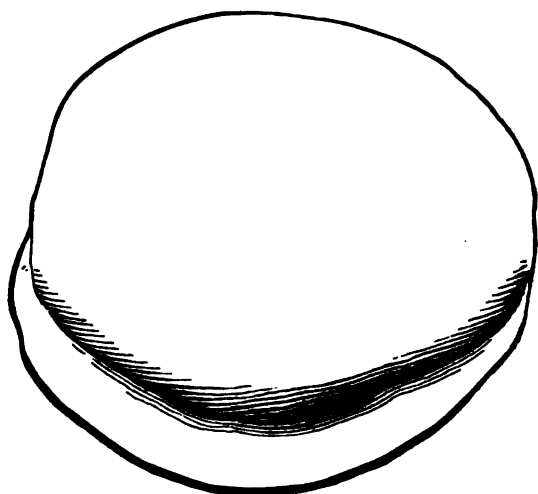
The object of the first year's work in pruning is more to secure a solid, stocky tree, capable of carrying its future load of fruit, than with any view of immediate profit. If the work is properly done, a thrifty tree will result, and the patience and care of the orchardist will be well remunerated. When the tree has been formed, the question of pruning becomes one largely of locality and variety. In some places, with some varieties, the tendency is to make wood too rapidly. In others the growth is slower, and the tree is able to support all its wood and fruit, and little, if any, cutting back is required.

The matter of pruning, not alone of the apricot, but of other deciduous trees, is a mooted one, and has given rise to more argument than any other phase of orchard work. It is here that the judgment of the grower must be exercised, and he must consider the character of his soil and climate, the varieties he is growing, and the peculiarities of each individual tree.

The tree from the ground should be trained to form a low, well-bal-

THE APRICOT.

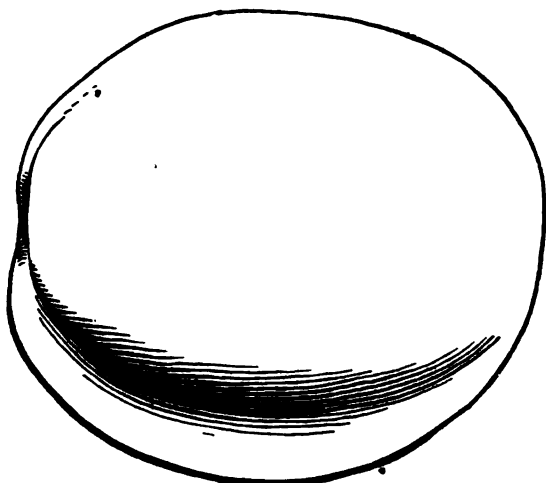
PLATE VIII.



1. Peach.



2. Pit of Peach.



3. Montgamet.



4. Pit of Montgamet.

anced head. Train to a central stem and leave the lateral branches, three to five in number. The second season's pruning consists in heading back the vigorous growth of the first year to twelve or fourteen inches, while all branches springing from the underside of the main limbs and all which cross each other are removed.

By J. B. Parker, of Orange.

The apricot with us grows much as it does in the north. From my experience and from what I have read and heard, I find that the tree has a tendency to branch out too much, and I give it a summer pruning about the last of May, as a rule. I give it a fall pruning also, and cut back within ten inches of the old growth; that is, on the last ten inches of the new growth on each tree. The result is that I get my trees in a very compact head and my trees blossom finely. Some did well where they were pruned once a year, but my observation goes to show that the summer pruning had a great tendency to make the fruit earlier, though it might have the effect to dwarf the tree in the future.

By Dr. Edwin Kimball, of Haywards.

In regard to pruning the apricot tree, the old saying will properly apply: "He who spares the rod spoils the child." It is necessary to use the knife freely on the apricot tree, in getting it into proper shape. It is a tree which is particularly inclined to overbear, the consequence of which is a large quantity of small, inferior fruit that you cannot sell to canners at all, and which takes a longer time to prepare for drying. In raising apricot trees, if you receive the trees from the nursery, yearlings or two-year-olds, I think that they should be trimmed severely for about three years, to place them in a condition so that they will not split down, for I believe that of all the trees that we rear in the central part of the State, and perhaps here, the apricot is more inclined to split down and be broken by the wind and by its weight of fruit, than any other tree that we raise. I have had some trees that I think produce from 700 to 1,100 pounds of apricots in a year, and they are not headed at all; or, I might say, headed in a group—two or three limbs divided right together. In first forming a tree, if you let three buds come out together and reach out in different ways, when the trees bear heavily, they will split down. The tree should be shaped, if possible, so as to have one leader—one center—and they should be trimmed to come out, not at a point of junction, but two or three or four inches above or below, and you have a symmetrical tree, and without danger of breaking down in that way. As I have said before, it is necessary, in order to get the best results, to thin out thoroughly. I always leave these lateral branches from the central branch that forms the head of the tree—one coming out on the east, one on the west, one on the north, and one on the south; trim them similarly as you do the center and you have then a symmetrical tree. Of course, the apricot tree should be severely cut, because if you let the tree fruit and if you trim it too close—hedge-like form—you will have a large quantity of fruit of an inferior quality; but if you cut back to the three lateral branches besides the main center, keep it thoroughly thinned out, and when you cut off the ends of the limbs of a year's growth do not let it be too broomy; by that way you save the process of going through your trees and thinning them so much, for in our section of the country we not only have to trim our trees sharply, but go through and pull off the fruit.

In regard to summer pruning, if there is danger of the tree growing so fast as to become very much out of shape, as apricots sometimes do, I would use the knife to put it in shape. The apricot is the most wonderful grower, I think, of any tree we have. If I find its limbs commence growing down instead of growing up, I cut those off, but we do most of our pruning in winter.

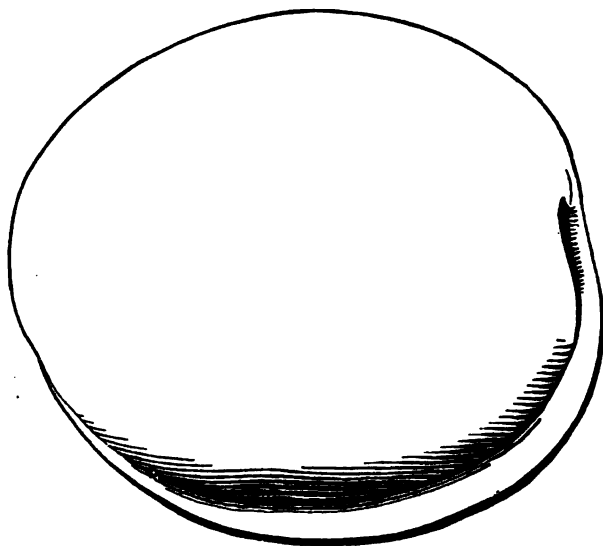
THINNING.

Thinning the fruit on the trees is as important as pruning, and requires as much care. It is not a pleasant thing for the young orchardist to pick off and throw away one half to two thirds of the fruit which he has been so anxiously working and waiting for. Yet the operation will pay him in the superior size and quality of the fruit which is left to mature and in the extra price it will bring. Apricots which are smaller than twelve to the pound are not desirable, and a tree three inches in diameter should yield fifty pounds of fruit; this would leave six hundred apricots to the tree. As the tree increases in age and diameter, its weight of fruit may be increased.

In the matter of thinning the fruit, as in other points of orchard work, authorities differ. All admit that some thinning is necessary in order

THE APRICOT.

PLATE IX.



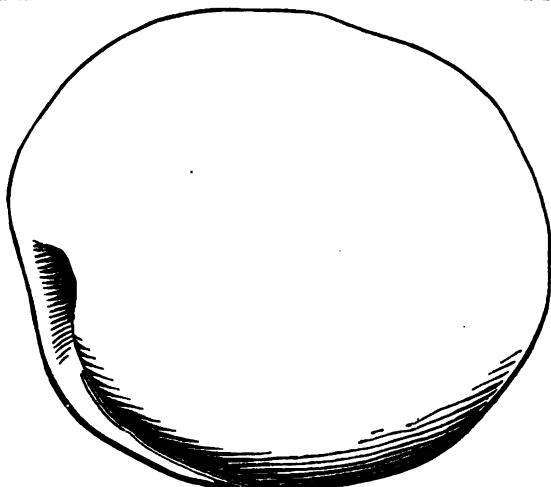
1. Sparks.



2. Pit of Sparks.



4. Pit of Routier.



3. Routier.

to achieve the best results, but the amount of thinning to be done is the matter in dispute.

By D. C. Vestal, of San José.

Don't thin much. Where there are large clusters and the fruit is crowded, remove the smaller specimens and leave the larger ones room to develop; but where there is ample room for your fruit to grow without crowding, leave it alone. Of course, I recognize the fact that the apricot is liable to overbear and produce a large crop of small and worthless fruit if left alone, and to overcome this I prune my trees when they are in bloom, removing enough of the blossom-bearing wood to relieve the tree, and leave the strength of the tree to be forced into the young fruit. I think this is preferable and produces better results than where the tree is left to half mature its full crop, only to have its efforts wasted by the throwing away of a large part of the half-grown fruit. Whether I am right or wrong, it is my way, and I have no cause to change my opinion in the output of my trees.

In the matter of both pruning and thinning Mr. Vestal differs widely from many other growers of prominence. Among them J. H. Flickinger, who advocates and practices both severe pruning and vigorous thinning.

By J. H. Flickinger, of San José.

Thin, and thin vigorously. Of course a great deal of judgment must be used here as elsewhere in orchard work. We have to take account of the seasons, the bearing qualities of the tree, the quantity of fruit which has set upon it, and the variety of tree. Some apricots, as the Blenheim and Hemskirke, will mature more fruit than others, and require a more vigorous thinning in order to secure the best results. But taking the average apricot tree, in a condition to carry through and mature its entire load of fruit, and when fruit sets thick on it 75 per cent should be removed. In unfavorable seasons, when the crop does not set so heavily, lighter thinning must be had, or, in some instances, none at all. The grower must calculate how much his tree ought to carry, and how many apricots will make a sufficient load for it; how many it can bring to the highest state of perfection, and then, without any hesitation, remove all the rest. It is better that a man should harvest two hundred pounds of good fruit, for which he can command a high price, from a tree, than that he should gather five hundred pounds of inferior stuff, which he cannot sell at any price. By the process of thinning the greater part of the weight is left, the tree is relieved of a large part of its burden, and can carry the remainder with less danger of breaking down under it, and the fruit will command a much higher price.

The larger number of growers believe in thinning very extensively. The work is commenced immediately after the fruit has stopped dropping, and when it is known to what extent the dropping will render thinning necessary. The trees sometimes thin themselves and render further attention in this direction unnecessary, but when it is necessary to lighten the load they must be thoroughly thinned by hand, and after a careful estimation of the quantity each limb will bear, the rest should be removed.

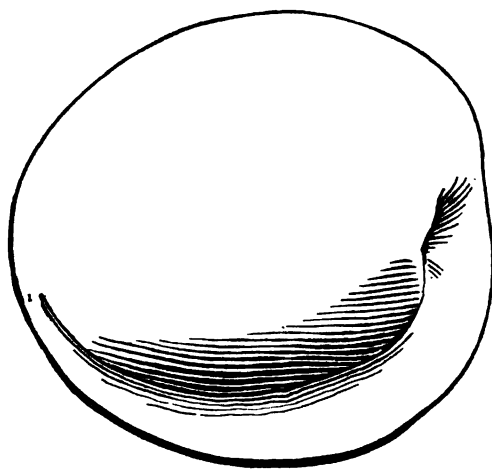
By E. A. Bonine, of Lamanda Park.

We invariably go over our orchard, whether the crop is light or heavy, and thin our fruit; thinning by hand, the only proper way. I know people who throw stones up, and others who use pitchforks and thrash the trees. I have been told, "Oh, I never thin; the big ones will crowd the little ones off."

The past two springs our apricot trees were an unusually long time blooming, caused by an insufficiency of rain during the winter season; no irrigation is practiced. I thought that the small fruit coming so much later than the bulk of the crop would be so much later in ripening, but they all ripened together, and last season the trees were heavily loaded; this season very lightly; so I concluded that the trees having plenty of sap the little ones would ripen later and grow large; but again they all ripened together. We had a plentiful supply of rain last winter, but it could not affect the already formed and partially dried-up fruit spurs. Next year *I shall pick all the little ones off*, no matter where located. While the men are thinning I examine their work. The first thing I do is to look upon the ground, and if the small ones are there, so far so good; then I look over the tree and see if they have scattered them properly. An upright limb at an angle of 45° will hold more fruit than a horizontal one or one bending or hanging down, for the reason that when the limb bends the flow of sap is retarded; the reverse principle acts exactly the reverse. Should a shade or ornamental tree lose its top by wind or accident, a leader can be made quickly by bending a branch upright and tying it there,

THE APRICOT.

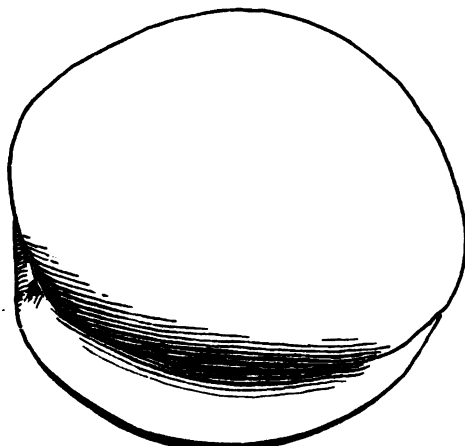
PLATE X.



1. St. Ambroise.



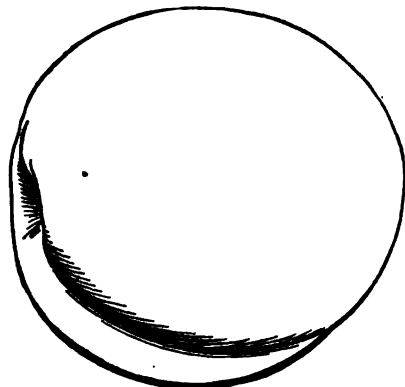
2. Pit of St. Ambroise.



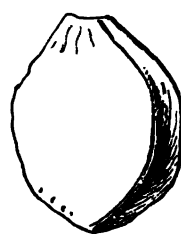
3. Hemakirke.



4. Pit of Hemakirke.



5. Large Early.



6. Pit of Large Early.

so that it can receive a strong flow of sap. I have seen seasons when all the fruit grew upon one fourth of the tree, and that would be heavily loaded. Only a certain amount of sap can flow through a limb, and the thinning must be done as resolutely on the small crop, if not spread over the tree. The man who goes into the fruit business without any love for investigating nature's ways, who plants trees and expects to do no other work than when the fruit is ripe to go and pick it, will surely get left, for trees require care, and they must have it at certain times, and I incline to the opinion that very large orchards will seldom be profitable.

As to how far apart the fruit should be upon the tree, you can establish no rule, for fruit does not grow regularly over the tree and you must be governed by the vigor of the tree. At thinning time the tree that is overloaded has generally a deficiency of leaves, and the size of the fruit at that time decides how much to take off. I generally send the men back to such a tree and tell them how much more to take off, for they seldom remove enough. Be sure of one thing: thinning fruit is not like the new fruit-cutting machines as advertised, that profess to cut three tons an hour and a child of twelve years can run them. A neighbor sent out a small boy to thin his cling peaches; after he had been out a time, he went out to see how thoroughly the boy had done his work. He had finished six trees and had picked *all the peaches off*.

I consider the proper way to do is to *avoid thinning* as much as possible. In pruning, go over the sides and tops of the trees with a pair of handled shears; we use light ones—two feet three inches long. The pruner uses a step-ladder for top work, and cuts the branches eight or ten inches from the last pruning, and generally throws his prunings off with the shears; then takes a very light pair of hand shears and goes through the center and trims short all the new growth. If you prune in this way you will not need to thin so much. If fruit trees can be prevented from over-bearing they will bear more regularly. This great quantity of fruit that is picked off is a great waste of life force; but we must thin anyway; all small and defective fruit must come off before the stone hardens, and we find it wisest considerably before.

Some one advised thinning the blooms, but he is too smart for anything. Perhaps he sits by his desk and does his thinning, or maybe he has half a dozen trees in his back yard and writes "all any one needs know about fruit raising." His heart would certainly fail him if he looked upon a fifty or one hundred-acre orchard in full bloom.

PICKING.

Picking the apricot is usually done by hand, and is a simple operation. Whether the fruit is intended for drying or for canning, it is left on the tree until thoroughly ripe and is then gathered by hand, step-ladders being used to reach the higher limbs. Each fruit as it is picked is carefully placed in a box. The boxes are placed on a truck and taken direct to the cannery or drier.

The fruit intended for shipping is picked with care before it is thoroughly ripe.

By Arthur J. Towner, of Santa Ana.

When picking time comes I have the ground in my orchard under the trees as smooth and free from clods as I conveniently can. Then, as the fruit ripens, I have that on the lower limbs picked by hand, while that on the higher limbs is generally jarred off. For this the pickers use a long forked stick, shaking one limb at a time. The fallen fruit is quickly and carefully picked up and taken to the cutters as soon as possible. For this I use a stone-boat and steady old farm horse. Very cheap help can be used for picking up the fruit in the orchard—cheaper than that paid a regular "picker."

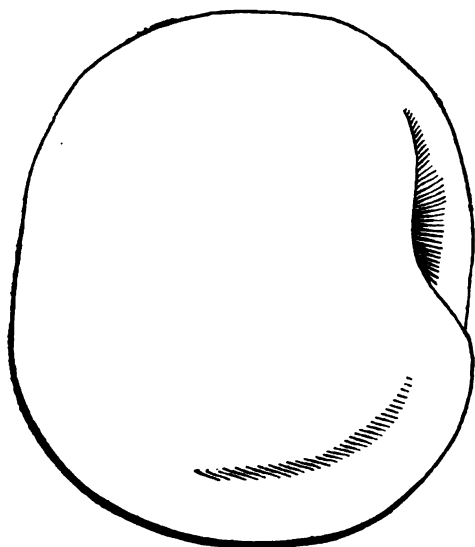
No fruit need go to waste by this process, unless it be the very little green which may jar off, and of this not so much as is *rubbed* off when the pickers climb about in the trees.

Toward evening, however, there must be fruit left over night for the cutters to begin on in the early morning. This fruit I have picked by hand, as it will keep better. We have generally paid cutters—they "lay" and cut both, of course—15 cents per 75-pound box. This is more than some pay, but I have better help at this price.

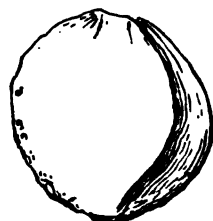
I would here emphasize one special economy the fruit farmer must practice who would make the most off his apricots: *Save all the dropped fruit*. I do not mean the fruit jarred off, but that which falls of itself. This in any apricot orchard, however carefully picked, is inevitably a large percentage. According to my observation, this is generally left to rot and waste. According to years of experience this fruit, if saved, over and above paying for itself, will pay much toward all the running expenses of a season's cure. Year after year I calculate it has paid for my trays, my boxes, etc. Some heavy years I know this fallen fruit, saved, has amounted to enough to pay for all my hired help. It is a slow, insidious waste, and as I said before, quite generally passes unnoticed; yet it makes fine dried fruit. In the height of the season the whole orchard must be gone over twice a day to gather up the dropped fruit. I have used very cheap help for this. Children can make good wages at it. I do not allow this fruit to be piled in the

THE APRICOT.

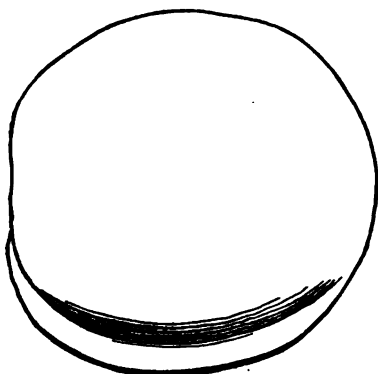
PLATE XI.



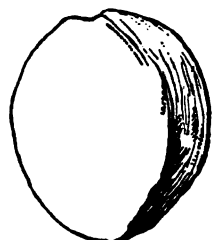
1. Vestal No. 2.



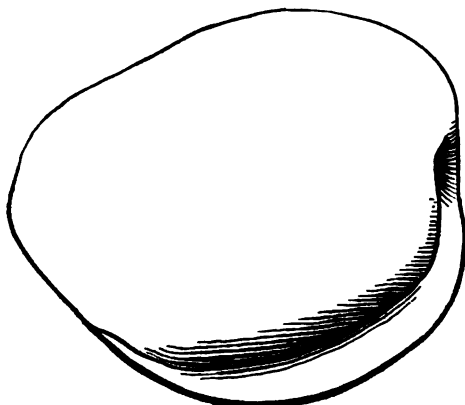
2. Pit of Vestal No. 2.



3. Jackson.



4. Pit of Jackson.



5. Smith's Triumph.



6. Pit of Smith's Triumph.

boxes—only half boxes of it, to save crushing it—better still, if it can be cut from the baskets.

In fruit raising, as in any other business, the most money is made by utilizing everything. Even the green apricot, where there is a market for it, can be made into jelly and sold.

GRADING.

After the fruit is gathered, and before it is delivered to the packer, it is run through a grader and assorted into from two to more sizes. This work is done very rapidly by means of improved machines, of which there are several on the market—some with meshes of different sizes to allow the various sized fruit to pass through into the receptacles placed to catch it below; others substitute sheets of galvanized iron, perforated with round holes of the required sizes to permit the passage of the fruit, and others are arranged with one or two revolving rollers, which can be adjusted to any size to suit the kinds of fruit upon which they are to be used. Most graders are made in the form of an inclined plane; some, however, vary from this and are constructed in the style of a fanning mill, with the different sized screens arranged one above the other, with a slight incline, and arranged with a spout on the side, where each size drops into a box arranged to receive it.

The objects to be attained in grading the fruit are equality in drying and the more uniform appearance of the cured fruit. The smaller fruit dries more rapidly than the larger, and by grading into sizes as it comes from the tree greater uniformity in drying is secured and a more even quality of finished fruit is the result. The grader also removes all twigs, leaves, or other foreign substances which may have become mixed with the fruit in picking.

CUTTING FOR DRYING.

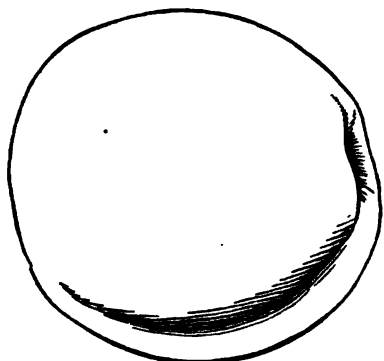
In the cutting-house large benches are arranged, around which the cutters, usually women, girls, and boys, sit at their work. Each one of these is furnished with a tag, upon which the foreman makes a punch mark for each box of fruit cut. These tags are turned in after the day's work, and each cutter is credited with the amount of work recorded thereon.

In cutting apricots a small knife is the favorite implement. Cutting and pitting machines are used to a very small extent, but little economy being found in their use, while the fruit which is fully ripe is liable to injury from bruising. The fruit is given a rolling motion with one hand as the knife is pressed and drawn upon it with the other, and the operation is a very rapid one. An expert cutter will halve and pit half a ton of fruit per day. A very simple but effective improvement on the ordinary knife, is the Mosher fruit knife. This is a stationary knife, so arranged as to leave the operator both hands for use. In this the fruit is held with both hands, between the thumb and index finger, and forced against the blade, or cutting portion. A quick pushing and turning motion is given, and the fruit is separated, with a clean cut, into two halves, while the same motion removes the pit by a slight pressure of the half retaining it against the lower portion of the blade.

On the work benches around which the cutters are engaged are placed the drying trays, and as the fruit is halved it is placed on these, cut side up. A number of operators usually work on the same tray, which is

THE APRICOT.

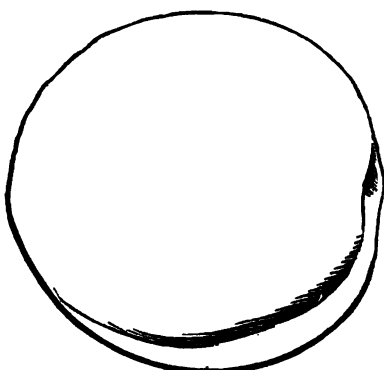
PLATE XII.



1. Duboise's Early Golden.



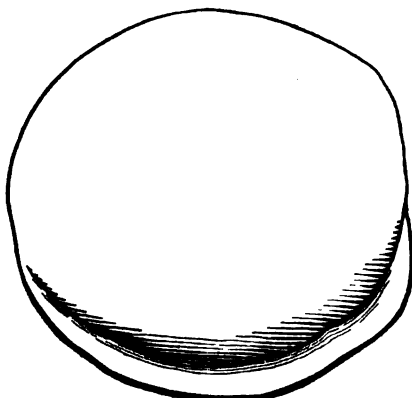
2. Pit of Duboise's Early Golden



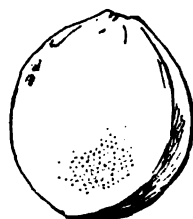
3. Roman.



4. Pit of Roman.



5. Beamer.



6. Pit of Beamer.

thus rapidly filled, and as soon as filled is removed and placed on a truck ready for the sulphur-house.

DRYING TRAYS.

The trays are simply shallow wooden receptacles, of various sizes, according to the judgment of the owner, made of light wood, and easily handled. They are generally made of half-inch material, the usual size being three feet long by two in width, fastened at each end by a cleat. This size of tray has been found the most convenient to handle, requiring but one person to move it. In raisin districts the same trays are used for curing raisins later in the season.

By F. M. Righter, of Campbells.

Profit by the experience of others, and make no tray less than 3x8 feet. It costs as much to handle a 3x6-foot tray as a 3x8-foot tray, while about one third more fruit can be handled by using the larger tray; thus using a 3x6-foot tray results in a great and unnecessary loss.

So near as I can learn, the preference is decidedly and wisely in favor of Oregon pine for sides, ends, and lath, and 6-inch sawed redwood shakes. The objections to white fir, termed "white wood" by some, are that "it warps badly," and is "short-lived." *Split* redwood shakes also have the fault of warping more than *sawed* redwood. With the exception of the lath, first-class redwood makes a very good tray—perhaps as good as any. The tray frame should be 1x3 inches. The redwood shakes should be seasoned before using for the tray, or the fruit may be stained where it comes in contact with them.

Make a rough table 5x9 feet, as high as convenience in nailing may require. On this construct a tray-holding frame in this manner: Fasten firmly to the table's top two side-pieces, 2x3 inches and 7 feet 10 inches long. The inner sides of these pieces should be parallel with the side edges of the table, and respectively 11¼ inches from those edges, their ends being respectively 7 inches from the ends of the table. The distance between these pieces is 36¼ inches. Place two 3-foot end-pieces 2x3 inches, the inner sides of each being respectively 5½ inches from and parallel with the ends of the table, and the ends of the end-pieces on a line with the inner sides of the side-pieces and 1¼ inches from the ends of those pieces. This completes the outer portion of the tray-holding frame, the dimensions of which are 36¼ inches by 8 feet ¼ inch, being ¼ inch larger on both the sides and ends than a 3x8-foot tray. Put the tray-frame into this incomplete tray-holding frame and nail it together with eight 2½-inch wire nails. The inner portion of this tray-holding frame may be made of 2x2-inch material. Place the two side-pieces, 7 feet 10 inches long, within ¼ of an inch of the inner sides of the tray-frame, and the end-pieces the same distance from the ends. Make the end-pieces each 15 inches long, leaving 4 inches unoccupied in the middle of the tray-holding frame. Fill this 4-inch space through the center of the tray-holding frame with a piece of timber 2½ inches thick, 4 inches wide, and 7 feet 9¼ inches long, covering its entire upper surface with a strip of sheet-iron ¼ of an inch thick. The tray-holding frame is then complete. The space to be occupied by the tray-frame is 1¼ inches wide. It is well to have it that width, as some of the sides and ends of the trays are more than an inch thick; besides, if the space were less the work of putting them in and taking them out could not be done so quickly.

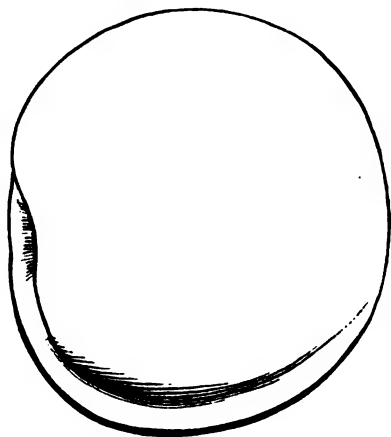
Make a mark in the center of the outside ends of the tray-holding frame; this will show just where to place the central lath, and thus prevent loss of time that would otherwise occur. The unoccupied space along the sides and ends of the table is intended for holding nails. Partition this space into four apartments, each the full length of the tray-holding frame, to be occupied by nails of as many lengths. The ends will each need one space for nails, which should be as near the ends of the central lath as possible, as it is to contain the nails used in the ends of that lath. Use ½-inch clout nails in the central lath, except the end of it; use wire nails there and at all other places. I think 2½-inch nails for the tray-frame; two sizes, 1½ and 2 inches, for shakes and side lath, are large enough. Six nails are required for each 6-inch shake—two at each end, two in the middle.

After the tray-frame has been nailed together with 2½-inch nails, put on the sixteen shakes required to cover the bottom. Fasten these in their places by putting one 1½-inch nail at each end of every shake, an inch or so from the same edge. These nails are large enough, since they are prevented from coming out by the lath being placed over them.

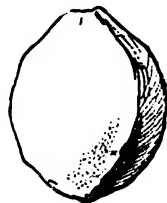
Use 2-inch nails, or a little longer, in putting on the side lath. Drive these nails through the side lath, so as to pass through the shakes about the same distance from the edge as did the 1½-inch nails, and directly opposite them. Next nail the central lath with 1½-inch nails at each end, taking these nails from a receptacle made as near as possible to the place where the nails are to be used.

THE APRICOT.

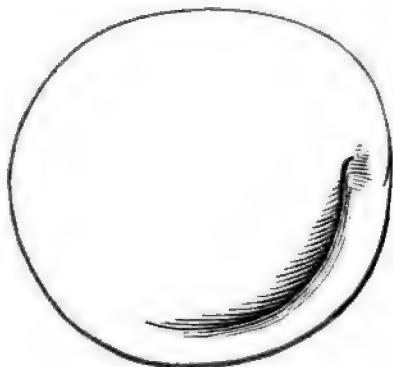
PLATE XIII.



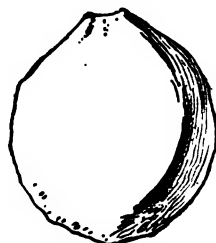
1. Coulange.



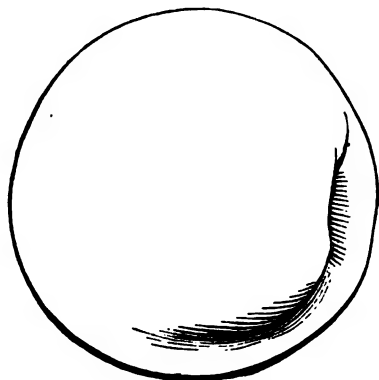
2. Pit of Coulange.



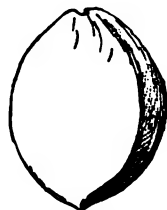
3. Triumph de Bussaire.



4. Pit of Triumph de Bussaire.



5. Glori de Pourtales.



6. Pit of Glori de Pourtales.

All other nails used in the central lath should be $\frac{3}{8}$ -inch clout nails, driven at a slight or very acute angle. If so driven they will clinch themselves on striking the strip of sheet-iron. That is the object of the sheet-iron. If not so driven the point may stop when it strikes this iron strip and fail to clinch, thus causing a waste of time and nails, besides rendering the sheet-iron strip worse than useless.

By Arthur J. Towner, of Santa Ana.

The ideal tray, to my mind, on which to dry apricots, is 2x3 feet, and made of sawed lath, smooth side up, with inch or $1\frac{1}{4}$ x $\frac{3}{8}$ -inch stuff for *sides* and half-inch lath for *ends*, and cross-piece underneath. This is an important point to me, simple as it sounds, for I look ahead to save wear and tear. Some use the heavier stuff for ends and the lighter for sides; but this way the sides are apt to spring when weighted and piled high, and hence many will spring in one season's use. Not so the other way, according to my experience, for, you see, with inch sides, springing is not only prevented, but the end-piece, which must be lapped on, can have two nails in it; and in the stay or cross-piece underneath, a larger nail can be used. A mechanical eye can see by this that the parts of the tray are tied together, as it were, and must necessarily be stiffer in handling, and more durable. I generally allow fifty trays per ton of green fruit, calculating it takes from four to five days to dry the fruit. Stretchers for carrying the loaded trays must be strongly made, of size to hold two piles of trays, and any style otherwise to suit your fancy. The number of stretchers is according to size of orchard or crop and methods of handling and sulphuring. As to amount of fruit to be laid on each tray, one must know enough of the matter, by doing it himself, to be able to watch the cutters carefully and that he lays the fruit well, skin side down and pretty well crowded on the trays. And the fruit must be cut evenly in two—a clean cut—leaving no shred of attachment, or the halves will not dry in good shape. Very soft fruit must be deftly shaped a little when laid down. And right here I will say that for the apricot I do not believe in any cutting or pitting machine that ever has or ever will be invented. In order to use a machine the fruit has to be too hard to make first class dried fruit.

SULPHURING.

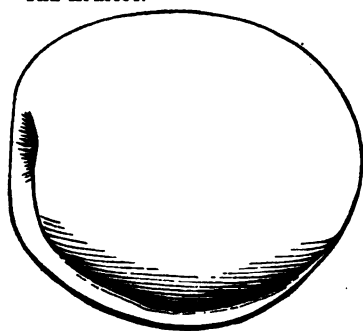
When the trays are filled they are removed by attendants and placed on a truck, which runs on rails between the rows of cutting tables and leading direct to the sulphur-house. Twenty trays or more make a truck load, and these are separated from each other by slats, leaving a space through which the sulphur fumes can penetrate, reaching every part of the fruit. When a load has been made up it is run into the sulphur-house and exposed to the fumes of the burning sulphur for a space varying from a few moments to several hours, according to the ideas and judgment of the operator. This operation sets the color of the fruit and renders it more attractive in the market.

Like many other matters in fruit growing and curing, the sulphuring process has many advocates and enemies. The former claim that fruit is improved by sulphuring, the latter that it is injured. Without going into the merits of the case, it will be sufficient to say here that fruit is sulphured; that its attractiveness is increased by the operation, and that it finds a readier sale than the unsulphured article. These being existing facts, and there being a public demand for light colored fruit, the driers will accede to it, and those whose scruples may prevent them from resorting to the process of beautifying their fruit will sacrifice their profits to their scruples.

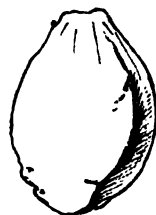
The best bleachers are so constructed that a truck load of trays can be run into them and extra handling be avoided. Their usual dimensions are 4 feet in width, 6 feet in length, and 7 feet in height. At each end is a door, usually hinged at the top and made to open up by means of a rope and pulley. An ordinary four-wheeled truck can be used, and on this are piled the trays of cut fruit, thirty or forty in number. The loaded car is run into the bleacher, the sulphur ignited, the doors closed, and the fruit exposed to the sulphur fumes. From this bleacher the fruit is run direct to the drying-ground. In small orchards

THE APRICOT.

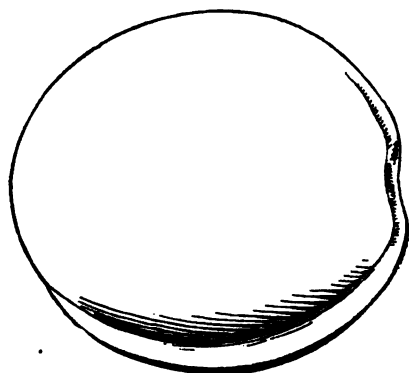
PLATE XIV.



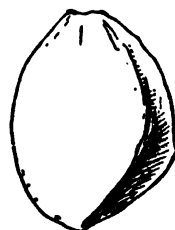
1. Kaisha.



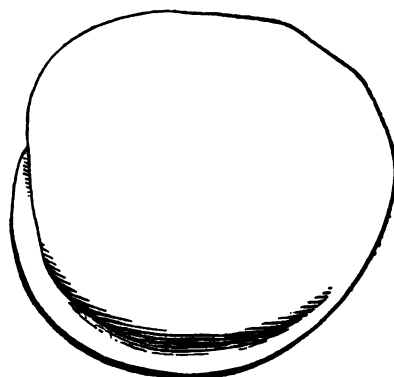
2. Pit of Kaisha.



3. Jaques.



4. Pit of Jaques.



5. Jannicot.

a less elaborate bleacher can be used. This is simply an upright box, made tight, with cleats on each side, into which the trays of cut fruit are slid. The most convenient size for these is a little over 3 feet in width, so that the 3-foot trays will slide on the cleats easily; 4 feet 8 inches long, which will admit two trays and leave a clean space of 8 inches; and of any convenient height, say 6 to 7 feet. These are made on an outside frame, flooring timber being used on the inside, which gives a smooth, tight surface on three sides and the top. There is no floor required, and the whole front opens with a door, hung either from the top or side. Inch square cleats, about $3\frac{1}{4}$ inches apart and starting 18 inches from the ground, are nailed on the long sides of the bleacher, upon which the trays are placed. This is the whole construction of a bleacher, and one of this size will accommodate thirty to forty trays, according to its height. In placing the fruit in the bleacher, the extra space between the walls and the trays should be divided, leaving the trays one inch from the walls and an inch apart; this permits the sulphur fumes to permeate every part of the bleacher and to reach all the fruit. Some growers, however, place the trays tightly against the wall, leaving the entire space on one and the other side, alternating with each two trays. On the first cleat the two trays would be set right against the back; on the second, brought close to the front; on the third, to the back; and so on till the bleacher is full, when the door is closed tight against one half the trays and the back is tight against the other half. By this plan, when the sulphur is ignited, the fumes are forced back and forth over the entire surface of the fruit to the top of the box.

The process of bleaching is very simple, and after the fruit has been arranged, consists of igniting a small quantity of sulphur, from one to two pounds, either crude or sublimated, in an old iron pan or dish, sunk slightly in the ground on the inside and near one edge of the bleacher. A moderate draft may be allowed, but the fumes of the sulphur must be confined to the bleacher.

By Arthur J. Towner, of Santa Ana.

I use a light, stoutly made, portable sulphur-box—one that I can set down over my trays wherever I pile them. I make a frame and cover it with a certain tough but pliable paper, which I purchase at the paint stores. This, for myself, I make large enough to hold two piles of my 2x3 trays, thirteen in a pile, i. e., twenty-six trays, and leave room at one end for the pan I burn my sulphur in; i. e., 6 feet long, 3 feet high, $3\frac{1}{4}$ feet wide, inside measure. This is big enough to hold stretcher as well as trays, for it saves one handling to leave the trays on the same stretcher on which they were piled in the cutting-room. (Be sure and cover the sulphur-box at night, to prevent fogs or dew warping the paper.)

As to quantity of sulphur for a box of such a size, I use one coffee-cupful best California sulphur, leaving the fruit in the gas one hour; and as to quantity of sulphur and rules therefor, let me remark in passing, that one must use enough to fill the given space with the sulphurous acid gas; that is, gauge your quantity of sulphur by the cubic contents of your box, not by the number of trays.

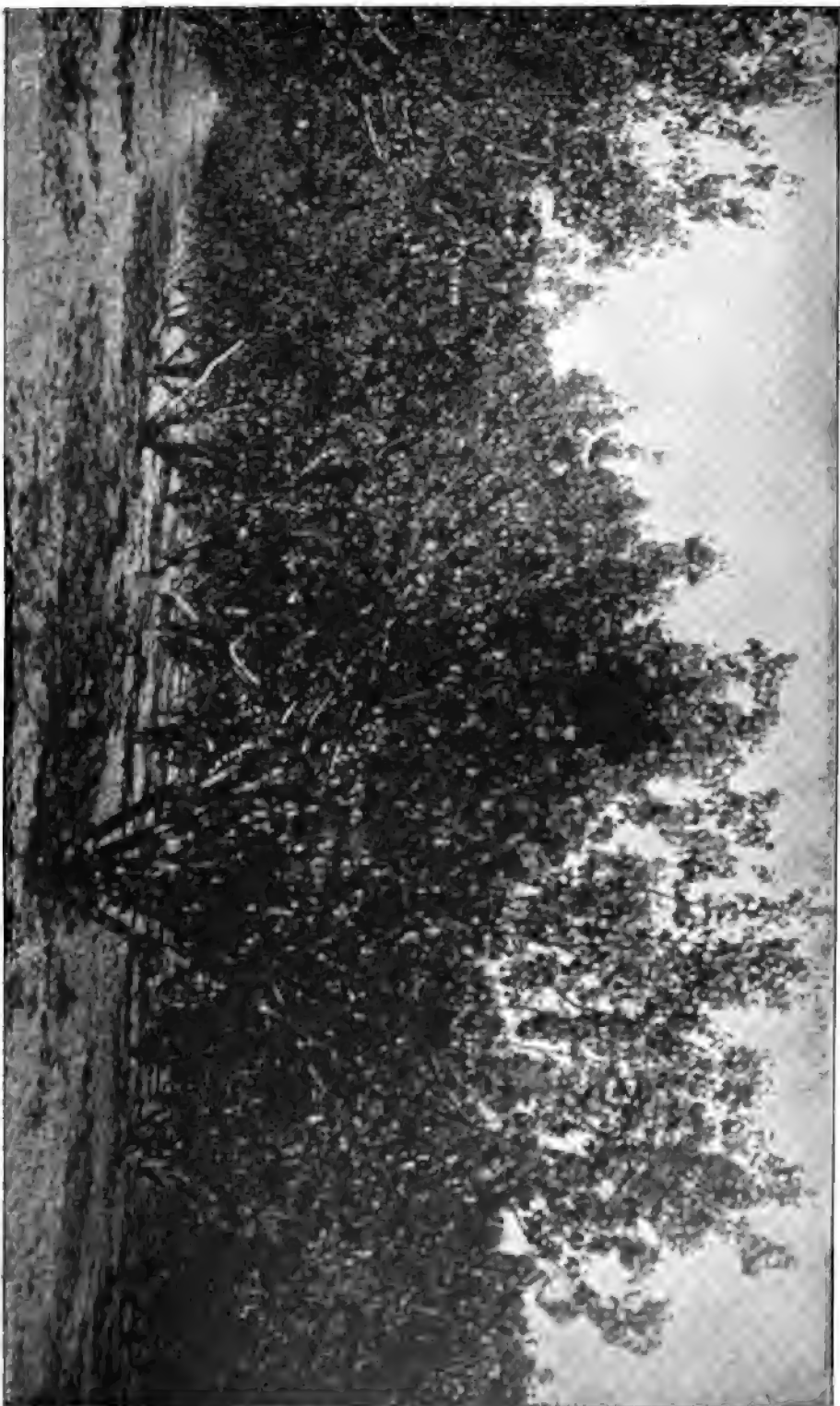
My method of burning sulphur is very simple. I take a newspaper, crumble it very compactly so as to make pockets all over it, lay it in my pan (an oil can split in two); pile my sulphur thereon, crowding it down; set the pan by my piles of trays, and, before I let the box slide over them, set this paper afire. It is simple but efficient. And yet, after all, this is not so simple as it sounds. A "green hand" is apt to arrange the paper and apply the match in such a way as to "fire off" the sulphur too quickly. The paper must be lighted on one side only. And one must vigilantly guard against two things, viz.: that the sulphur does not burn too quickly, and that it does not "go out on you," as we say. A long, *drawn-out smudge* is what is wanted; a keeping up of the bleaching process. If this is not effected, not only do you not get your money's worth out of your sulphur, but the under part of the fruit, the *skin*, is not bleached. In this case the fruit will be tougher, longer drying, and the *dark* back will spoil the appearance of the cut surface, no matter how bright it is. The ideal dried apricot is flat, of an even amber hue clear through, bright on the cut surface, and so translucent that when held



Two rows of 16-year-old apricot trees in orchard of R. C. Kells, Yuba City, showing method of pruning most generally adopted throughout the State.



Row of St. Ambrose Apricot trees (1 years old) in orchard of Hatch & Root, Bitter, showing method of pruning.



Apricot trees in full bearing, showing best method of pruning.

toward the light it is almost transparent. If the skin is not bleached to match the cut surface, the halves will curl on the edges, making the fruit seem much smaller. Too green fruit will do this anyhow, and will not bleach.

I generally allow five pounds of sulphur for a ton of green fruit. Each time I sulphur, I have my trays piled right by the place where they are to be spread on the drying-ground. When their hour is up, off comes the box to go over the next pile, and then the sulphured trays are spread out to the sun. It is a curious fact that one can get the box too tight. There must be a little ventilation in the upper part, so that the gas can replace the air, or else the bleaching of the upper trays will be incomplete; also have your pan of sulphur on that end of the box which is toward the wind.

By Ellwood Cooper, of Santa Barbara.

The sulphuring, in the process of curing or drying fruit, has been very largely discussed of late. It is claimed by some that there is danger of poison; from others objections are made from a moral standpoint. The remarks, however, are mostly made from statements without foundation in experimental facts. I have taken some pains to investigate what does result from the fumes of sulphur. I give below the statement of an analytical chemist of Philadelphia, a warm personal friend, to whom I wrote for information:

"Sulphur, when burned, combines with the oxygen of the air, forming sulphurous acid, a combination of one of sulphur with two of oxygen. It is a gas, and passes up among the fruit practically unchanged. Sulphurous acid is further oxidized by the action of air and moisture, forming sulphuric acid, a combination of one of sulphur and three of oxygen. This last process is, however, slow, unaided by stronger oxidizing agents. The quantity, therefore, formed in the process of fumigating, would be very small and hardly appreciable, and what little would be formed would enter into combination with the fruit and not be in the free state. The effect of sulphurous acid on vegetable and animal matter is manifold. The changes that concern your present inquiry are as follows:

"*First*—Bleaching, caused by the deoxidizing of the coloring matter contained in the fruit. In this action, the sulphurous acid combining with the oxygen of the coloring matter forms sulphuric acid, which combines with the vegetable matter of the fruit.

"*Second*—Sulphurous acid has the quality of combining with nitrogenous organic compounds (albuminous bodies) contained in the fruit, and preventing the decomposition of these easily decomposed bodies, thereby preserving the fruit in an unaltered condition. Sulphurous acid is therefore an antiseptic. Furthermore, the presence of a small quantity of sulphurous acid in the fruit aids in its preservation by preventing the action of parasites. In fine, the presence of sulphurous acid destroys spores and prevents the formation of fungi, thereby checking putrefaction and fermentation. The process of putrefaction is a complicated one; it may be considered as a slow combustion, commencing when fungi forms on the surface, with sufficient access of air. The fungi appears to transfer the oxygen of the air to the body; oxidation takes place, converting the elements of the body into carbonic acid, water, and ammonia. By alcoholic fermentation the sugar of the fruit is split up into carbonic acid and alcohol. I have examined some dried fruit from California, with the view of determining whether any free sulphuric acid was contained in the fruit. The result of my examination proved the entire absence of free sulphuric acid. There was a fraction of 1 per cent of sulphuric acid in combination with the fruit, amounting to only .05 per cent. I am of the opinion that the fumigating process, instead of being injurious to, or leaving any poisonous substance in, the fruit, is, on the contrary, beneficial, improving the quality of the fruit by preventing the formation of substances more or less injurious to health."

DRYING.

How long the fruit must be exposed on the drying-ground will, of course, depend upon the state of the weather and the condition of the fruit. In locations where the apricot thrives best the conditions are not always most favorable for its preservation. The atmosphere near the coast carries a greater percentage of moisture than it does farther inland. In Ventura County, where apricots are very largely grown, the producers ship their fruit to Newhall, a distance of fifty miles inland, where the hot desiccating winds, devoid of moisture, offer perfect drying conditions, and here is maintained the largest apricot drying-ground in California. Ordinarily it is unnecessary to cover fruit during the drying season. In locations, however, where fogs are liable to come in the night or on rare occasions of summer showers, the trays are gathered in piles from thirty to fifty each and covered. Ordinarily the fruit can be left until it is

sufficiently cured, and this condition is reached when it feels thoroughly dry to the touch, yet soft and pliable; it must not be overdried or left on the trays until it will rattle. When sufficiently dried the trays are gathered up and the fruit scraped from the trays into sweat-boxes, where it can be left for twenty-four hours or more. What little moisture is left in the fruit thus is thoroughly disseminated, and the whole mass becomes uniformly tough and pliable.

By Arthur J. Towner, of Santa Ana

Do not expose the cut fruit to the sun till after the sulphur-bath. I do not cover my fruit at night while it is drying, neither do I think it necessary to look my fruit over to select out that which is dry. If some dries before the rest I let my trays stand till all the fruit is dry; then I leave them out over night to gather moisture to soften them. Early the next morning I examine the fruit. If moistened just right—that is, pliable but not sticky—stack the trays immediately, covering the top tray with an overturned tray. If the fruit be too moist let it lie in the sun till it is just right; then stack, and have them put into the sweat-boxes the same day. Of course, I speak for my locality, where we have light fogs, which are really a help in curing the fruit.

SWEATING.

The fruit is exposed on the drying-ground until its moisture has become sufficiently evaporated to permit its being packed without danger of decomposition. This is indicated by its condition. It should be soft and pliable, tough but not moist, nor should it be left so long exposed that it will rattle. The trays are then collected and the fruit is placed in piles, the graded sizes being kept by themselves, and left to sweat. This process requires from two to three weeks, and the fruit should be carefully watched in the meantime to prevent molding or decay. If the fruit has been uniformly dried there is little danger to be apprehended from this, and ordinarily the fruit need not be disturbed until it is time to sack it. Some driers sweat their fruit in rooms provided for the purpose, and it is dumped in great piles on the floors; others put it into sweat-boxes and leave it there until properly cured.

By Arthur J. Towner, of Santa Ana

Here comes the "scraper" with his 2x4 piece of steel (cabinetmakers' wood-scraper), and scrapes the "cots" into the boxes. There they stand for twenty-four hours or more—to sweat even; that is, lose all chippiness, and get the uniform waxiness, which, with its translucence, makes the dried apricot such an attractive fruit to look at, and very palatable also, uncooked. But remember, *all* the trays must have been thoroughly dried before this moistening and sweating process, or the curing is not well done and the fruit will ball in the packing, mold and spoil. In the sweat-boxes and till sacked, the fruit must be kept tightly covered from the moths. With average drying weather the apricot will sun-dry in four days. Excessively hot weather scalds the fruit. Breezy, moderate weather is the best.

PACKING DRIED FRUIT.

As much care is required in packing fruit as is demanded in any other stage of its preparation for market, and the careful drier will have a heavy, well-cured fruit, retaining all its best qualities, yet thoroughly preserved, and salable at a good price; while another will have a light fruit, which will bring a smaller price and will not net nearly so much from his orchard. In fruit growing, curing, and packing, care and attention at curing time means dollars and cents at the end.

The standard boxes hold 25 to 50 pounds. These should be lined with white paper and faced with a sheet of oiled paper. The first layer is of carefully selected fruit, nicely arranged, with cut side down. Upon this

layer the fruit is carefully arranged until the box is filled; then a layer of selected fruit is arranged as in the first layer, but with cut side up; the whole is put under a press and pressed tightly in place, after which the top is nailed on. When the box is opened the fruit at either side presents a very handsome appearance.

The greater part of the dried fruit of the State finds its way to the Eastern jobbers in sacks. These are made of white cotton and hold from 75 to 100 pounds each. In the East the fruit is either sold direct from the sacks or boxed and packed there. This gives great saving in the cost of packing and freight.

By Arthur J. Towner, of Santa Ana.

For sacking dried fruit, use a stationary box, fashioned to act as a funnel, and raised about 36 inches from the floor. There are hooks about it on which to hang the bags. Dump the fruit through the wooden funnel in not too big quantities at a time, for the bags must be jumped, and bounced, and crowded with your hands now and then, to make it pack solid. Well shaken, they will average 85 to 95 pounds to the bag, regulation size, *i. e.*, 20x36 inches. I use soft-laid twine, No. 9, and a big darning-needle for sewing up the sacks. This twine sells generally at 35 cents per pound, and one half pound is ample to sew 100 sacks. Sacks cost $8\frac{1}{4}$ to 10 cents apiece. When I have made them at home they cost $7\frac{1}{2}$ cents per sack. I buy "Lawrence Mills L.L." A bolt of 50 yards makes about 44 sacks. In cutting allow one inch for seams, *i. e.*, cut 41 inches for a bag. We use No. 30 thread and No. 8 needle on our New Home sewing-machine. Two spools of thread will make up a bolt into bags. A bolt of 50 yards will sack about two tons of dried apricots, packed tight. Those who have the handling of the sacked fruit much prefer the bags should be so full there will be no "shucking."

My orchard dries five pounds of green fruit to one of dry. Six to one is the general average, I am told. I think the difference is in the way I manage my trees and ground. I never irrigate my apricots. Some seasons, when I think too much rain has fallen for the good of the trees, I purposely allow the soil to dry out to a certain extent.

VARIETIES.

Pringle (Fig. 1, Plate VI).—The Pringle is the earliest apricot grown in the State, yet in some sections it comes in together with the Newcastle; but in the coast and bay counties there is no material difference in the time of ripening of these two varieties. Being the earliest, it is valuable for shipping and is not used for any other purpose. The fruit is quite small, is quite acid, adheres firmly to the stone, and ripens in May and June.

Newcastle (Fig. 2, Plate VI).—This apricot is the choicest of the early varieties, and in some sections is the first to ripen; being larger and more showy, far supersedes the Pringle. Fruit medium size, nearly round, golden yellow, with red cheek in the sun, but rarely so, except when the trees are trimmed so as to admit plenty of light. The tree is a good grower and a heavy bearer.

Moorpark (Fig. 1, Plate VII).—Of the varieties, the Moorpark is the favorite, owing to its size, beauty, and keeping qualities. Its one drawback is that it is a very uncertain bearer. It seems to require a humid climate for the setting of its bloom. In the bay and coast counties it seldom fails to bear; in the inland sections it seldom, if ever, produces a paying crop. A great many experiments have been made, having in view the overcoming of this fault, but none have as yet proven satisfactory. In Santa Clara County the Moorpark has fewer off years than in most parts of the State, and its advocates claim that in the size and quality and beauty of its fruit, and the bearing yield it gives when it does bear, it more than compensates for its seasons of rest. Many theories are advanced to account for these off years on the part of the

Moorpark. There are several reasons why the Moorpark is a failure some seasons: The fruit buds sometimes drop before they unfold; the blossoms may fail to set and the bloom fall, or the young fruit may attain considerable size and then drop from the tree. This is commonly known as the June drop. It is asserted that there is a constitutional weakness in the buds of the Moorpark, and that whatever will cause them to grow strong and healthy, will save the crop. To this end irrigation in the fall, after the crop has been gathered, is recommended, to force the sturdy growth of the new fruit buds; or, where this is not available, judicious fall pruning, to force the sap into the remaining buds, or careful fertilizing with superphosphates, which gives the buds vigor and health and enables them to withstand the danger to which their constitutional weakness exposes them. On the other hand, it is claimed that the trees which grow wood most rapidly drop the most, and that the cause of fruit dropping is purely mechanical, due to the wood swelling more rapidly than the fruit bud, which is forced off. Whatever the cause, the fact remains that the Moorpark in most places is an uncertain bearer; but it is also one of the largest, most popular, and widely disseminated. Color, deep red, or brownish red; flesh quite firm, bright orange, parting freely from the stone; quite juicy, with a rich and luscious flavor. It is a good shipper and valuable for canning and drying. Canners, however, object somewhat to the Moorpark, on account of its habit of cracking at the stem end, which militates against it for canning purposes.

Royal (Fig. 3, Plate VII).—The Royal possesses many of the good qualities of the Moorpark, with the additional one of being a more certain bearer. This variety is a very general favorite with apricot growers over the greater part of the State. It is probably the best all around apricot we have, always productive. By judicious pruning and thinning it is almost as sure as the seasons, and when properly grown the fruit is of good size, excellent quality, ripens gradually, hangs long on the tree, and is eagerly sought for canning, and makes a splendid dried fruit. The Royal is of French origin, and ripens in July, and a week or ten days earlier than the Moorpark. Skin dull yellow, with an orange cheek; flesh pale orange, firm and juicy, of vinous flavor; tree a vigorous grower.

Blenheim (Fig. 5, Plate VII).—The Blenheim is of a beautiful lemon color when ripe, and is about the same size as the Royal; is valuable for both canning and drying, and its flavor unsurpassed. The skin is very tender and easily broken. Fruit above medium, oval; flesh orange with a deep yellow; juicy, and tolerably rich flavor. The tree is a vigorous grower, and has abundant foliage. In many sections the trees, when young, cast most of their fruit, but this is overcome by age, when it becomes a good bearer, and the fruit seldom needs to be thinned.

Peach (Fig. 1, Plate VIII).—This is a very large and handsome apricot. In the Sacramento Valley, and in Sutter and Yuba Counties in particular, it holds a favorite place; in fact, it has become so popular that many growers label it "The Marysville Apricot." It is one of the most valuable for shipping, as also for canning and drying, and is much sought after. This apricot strongly resembles the Moorpark, but is much larger and more compressed. Fruit of the largest size, about 2½ inches in diameter, roundish, rather flattened, with a deep suture; skin yellow in the shade, but deep orange, mottled with dark brown, on the sunny side;

flesh of a fine yellow saffron color, juicy, rich, and highly flavored; stone peculiarly perforated along the back.

Montgamet (Fig. 3, Plate VIII).—A large apricot of French origin; resembles the French apricot in shape and appearance. So far it is very promising, and is much liked by many growers in the Sacramento Valley. Form large, compressed, reddish next to the sun; flesh orange yellow, very firm, with a perfumed, vinous flavor. Ripens in July. Tree vigorous grower.

Sparks (Fig. 1, Plate IX).—An apricot of mammoth size, and which has proved very popular in the Santa Clara Valley of the south. Was originated by W. W. Sparks, of Ventura. The following description of it is given in the "Venturian," of June, 1893:

The variety is the result of experiments by W. W. Sparks, an intelligent horticulturist, some twelve or fourteen years ago. It first attracted the attention of Mr. N. B. Smith, in 1886, when he purchased his present place. At that time the trees were two years old, and some fifty in number. They began to bear at three years, and at four years of age bore very heavily. From that time to the present year they have averaged 200 pounds to the tree. The tree is a fine, hearty, strong, and vigorous grower, which puts forth much new wood. The fruit is an extra size, and particularly fine for canning. In flavor it is much like the banana, with the meat clear and juicy. It requires less sugar in canning than the ordinary variety, and as a fruit to dry has no equal. It is, on the whole, a tree which recommends itself in a very marked degree, and to those who seek a good variety we know of none which promises better results. It ripens about the same time as the Royal.

Specimens forwarded to this office, and from which the illustration on Plate IX was made, were very large, handsome, and attractive. Very clear, pale lemon color, speckled, especially on the side next to the sun. Color of flesh clear yellow, with shallow cavity at the top. Pit loose from the flesh. Flavor similar to Moorpark, and meat very tender, juicy, and sweet. It has all the good qualities of a choice apricot, excepting its color (being very pale lemon color), yet this may not prove a disadvantage, especially for drying.

Routier (Fig. 3, Plate IX).—A very choice variety, originated by Senator Joseph Routier, of Sacramento County, and is becoming popular, especially in the San Joaquin Valley. Mr. Joshua Worswick, of Grangeville, Kings County, reports:

My trees are five years old this spring (1893), and the average yield per tree was fully 250 pounds, individual trees running as high as 400 pounds. The tree in this locality is a prolific bearer and fine grower, and as yet has never failed to produce a crop of fruit, since first introduced here about ten years ago.

The Routier does not blossom so early in the spring as the other varieties, such as the Royal, Blenheim, etc., thereby escaping the danger of frost, which in some seasons materially reduces the crop. It is also a superior apricot for drying—our chief industry in this section—averaging about 5¼ pounds of fresh fruit to 1 pound of dried. So far as my observations go it has resisted all the scale insects, and I consider it the best apricot for all purposes in this locality. Green shipments are only an experiment with us as yet, the first apricots of this variety being shipped green this season (July). What the results are I am unable to state at this writing. Another good point about this variety is its large size, averaging almost twice the standard varieties, such as Royal, etc. The above information is from my own experience.

In shape it is very similar to the Peach apricot. It is deep yellow in shade, deep orange, mottled or splashed with red, in the sun; flesh juicy and rich, of excellent flavor.

St. Ambroise (Fig. 1, Plate X).—The St. Ambroise is a large and handsome apricot, resembling the Peach apricot. It is a good shipper and is also valuable for drying and canning. Along the coast and around the bay it is somewhat of a shy bearer. In the Sacramento and San Joa-

quin Valleys it bears well, but not regularly. The tree is a vigorous grower and of a weeping habit. Fruit compressed, of a deep yellow color, reddish next to the sun, and very smooth; flesh juicy, rich, and sugary.

Hemskirke (Fig. 3, Plate X).—This is a valuable variety and is very widely grown, especially in Santa Clara and Alameda Counties. It is a splendid shipper and valuable for canning and drying. It ripens even on both sides—a great point in canning. It somewhat resembles the Moorpark. The tree is a vigorous grower, and productive. Fruit large, roundish; skin orange, with red cheek; flesh bright orange, juicy and tender, with rich, luscious, plum-like flavor. Ripens in July.

Large Early (Fig. 5, Plate X).—This variety was at one time very popular in Santa Barbara and Ventura Counties. It is now superseded by other varieties, which have proved more certain bearers; nevertheless it is a choice apricot, very handsome and valuable for shipping, canning, and drying. Fruit medium size, rather oblong, compressed, pale orange in the shade, fine bright orange, slightly mottled, in the sun; flesh orange colored, rich and juicy.

Vestal No. 2 (Fig. 1, Plate XI).—A seedling from the Moorpark; originated by D. C. Vestal, of San José. Fruit large, compressed, rich yellow color; flesh rich and juicy; valuable for drying and canning. Tree strong grower and very productive. Ripens in Santa Clara County fully two weeks later than the Moorpark.

Jackson (Fig. 3, Plate XI).—A seedling of the Peach apricot; originated in Fresno County. When first introduced it gave promising returns, but has not proved itself worthy of future propagation.

Smith's Triumph (Fig. 5, Plate XI).—This variety originated at Vacaville; is a good shipper, and valuable for canning and drying, but is now superseded by other varieties.

Duboise's Early Golden (Fig. 1, Plate XII).—Fruit small, roundish, with deep suture; skin smooth, pale orange; flesh yellow, juicy, and sweet. This variety was planted extensively years ago, but is not now considered worthy of propagation.

Roman (Fig. 3, Plate XII).—An old standard variety, once largely grown, but not so now, since the introduction of choicer varieties. Fruit small, with sides slightly compressed; skin pale yellow; flesh dull yellow, soft, rather dry.

Beamer (Fig. 5, Plate XII).—Fruit resembles the Blenheim; medium oval, pale orange; has little merit.

Coulange (Fig. 1, Plate XIII).—A medium sized apricot, of but little merit.

Triumph de Busseire (Fig. 3, Plate XIII).—Medium size, of little merit.

Glori de Pourtales (Fig. 5, Plate XIII).—A medium sized apricot, of little merit.

Kaisha (Fig. 1, Plate XIV).—Fruit medium; has little merit; tree tender.

Jaques (Fig. 3, Plate XIV).—Fruit of medium size, of good quality, but too inferior as compared to others now grown.

Jannicet (Fig. 5, Plate XIV).—Fruit of medium size, inferior.

Luizet.—A new and promising variety, recently introduced from France. Said to be of excellent quality and a good shipper.

Purple or Black.—"This variety is quite distinct in all respects from all others; the fruit is small, and very much resembles a plum; skin red,

covered with delicate down; flesh yellow, juicy, and pleasant; very hardy."—John Rock.

Sardinian.—"A small, early apricot, the first of the freestones to ripen. Skin white, spotted with crimson; flesh very juicy, with a sprightly sweet flavor; stone very small."—John Rock.

Esperen.—"A midseason French variety, large, of best quality."—Leonard Coates.

Bonebon.—"From France, of enormous size, roundish oblong, quality first class."—Leonard Coates.

Gooley.—"New; a seedling; said to be the earliest of all the large varieties; from Solano County."—Leonard Coates.

Hinds.—"Introduced by I. H. Thomas, of Visalia; large, shapely, and ripening evenly; commended for its rich, juicy sweetness."—George C. Roeding.

Rivers' Early.—"Resembles Large Early, but of a richer, higher flavor and smoother skin; July."—George C. Roeding.

Musk Early.—"A new variety obtained from south of France. Very early, with a rich, musky flavor."—Felix Gillett.

Mexico.—"Medium large; sweet, juicy, delicious flavor."—Felix Gillett.

Peach of Nancy.—"One of the best."—Felix Gillett.

IV.

THE CHERRY.

(*Cerasus*.)

The cherry is a native of Asia. The cherry tree may be classed as one of the handsomest, as it is under favorable conditions one of the most profitable of our fruit trees. It grows luxuriantly and with great rapidity; has a smooth bark and heavy foliage. The black and heart-shaped varieties are especially vigorous, and form large spreading heads 40 or 50 feet in height. The acid or red varieties are of slower growth and do not attain so large a size. A strong illustration of the remarkable growth that the cherry will make in California, under proper conditions, and the equally remarkable yield of fruit, is furnished by the now famous Hector trees near Newcastle, in Placer County. Writing of these trees in the report of 1891, Mr. Hector gives an account of the character of the soil and the climatic conditions which have conspired to produce these phenomenal trees, and which, in less degree perhaps, may be found in other sections where cherry culture has proved profitable.

Experiments with the cherry in the hot, dry, interior valleys have not proved successful, and it is generally accepted as a fact that it does not do well there, although some varieties, where tried, have given good results.

While holding a front place among the fruit products of California, and aggregating a large amount, the cherry does not take a front rank in the volume of fruit shipments from the State, being surpassed by the shipments of oranges, peaches, prunes, and pears. However, the cherry, where grown under favorable conditions, has always proved itself

a remunerative crop, and, taking one year with another, there is no fruit that gives more satisfactory returns in the cherry regions.

Some cherries are grown in nearly every fruit county in California, but the principal cherry-producing section is found in the rich valley lands of Alameda, Santa Clara, Solano, Yolo, Butte, and Sacramento Counties. The vicinity of San Leandro, San Lorenzo, and Haywards, in Alameda County, is especially devoted to the growth of this fruit, and the larger part consumed in San Francisco is produced here.

SOIL.

Experience has demonstrated that the best soil for the cherry is a rich, not too light, valley land. Adobe is not so well suited for the cherry as a lighter and more friable soil. A soil containing much sand or gravel should be avoided. A loam underlaid by a sandy subsoil, or a deep loam, offer the best conditions, while a loam with a clayey subsoil is not desirable. On the foothills the light mellow soil is suitable for cherry growth, while the heavier clay soil is not. Where water stands near the surface, within 12 or 15 feet, the cherry will not thrive. To summarize, the best soil conditions for the cherry are deep loam, naturally damp, not wet, with the moisture equally distributed, avoiding dry sandy and gravelly soils.

By G. M. Gray, of Chico.

In setting out a cherry orchard select good, well-drained, sandy loam, in as early a locality as possible, as it is "the early bird that catches the worm." It is a strange fact that cherries ripen as far north as Chico a week or ten days earlier than they do a hundred miles farther south, and nearly if not quite as early as at the noted Vacaville and Winters section. Plow at least 12 inches deep; 20 inches is better. Harrow well, and stake perfectly straight in each direction; trees to be 33 feet apart. This may seem too far to those who have not had experience with old orchards. At that distance they will lap limbs before you will want to stop picking fruit from them. Dig the holes deep and broad, leaving the center of the bottom a little higher than outside. Cut off all bruised or broken roots. Spread well and tramp the richest soil firmly around the roots, leaving the dirt loose on top and a little lower than the margin.

PROPAGATION.

The seed from the Black Mazzard cherry produces the best stock for raising standard cherry trees. The raising of cherry seedlings is not very difficult, yet to be successful it requires considerable attention and the following of details closely. Cherry seedlings do not grow as rapidly as the peach or apricot, and the plants are seldom budded until the second year's growth. The fruit is collected when fully ripe and the pulp washed off; the pits are soon thereafter placed in boxes, covered with alternating layers of sand, and thus kept until spring, when they are planted in well-prepared seed-beds, or in nursery rows. Cherry pits start very early in the spring and should be planted in February, as soon as all signs of frost are over and the ground begins to get warm. The season following, the plants may be transplanted to permanent rows in the nursery.

After the seedlings have been planted in nursery rows, they are generally ready for budding in the following August. The bud is inserted as near the ground as possible, and from it springs a strong, straight shoot, thus insuring a good, smooth trunk for every tree.

Dwarf cherry stocks are not extensively used in this State, but in some sections they are preferred. For dwarf cherries the seeds of the Mahaleb



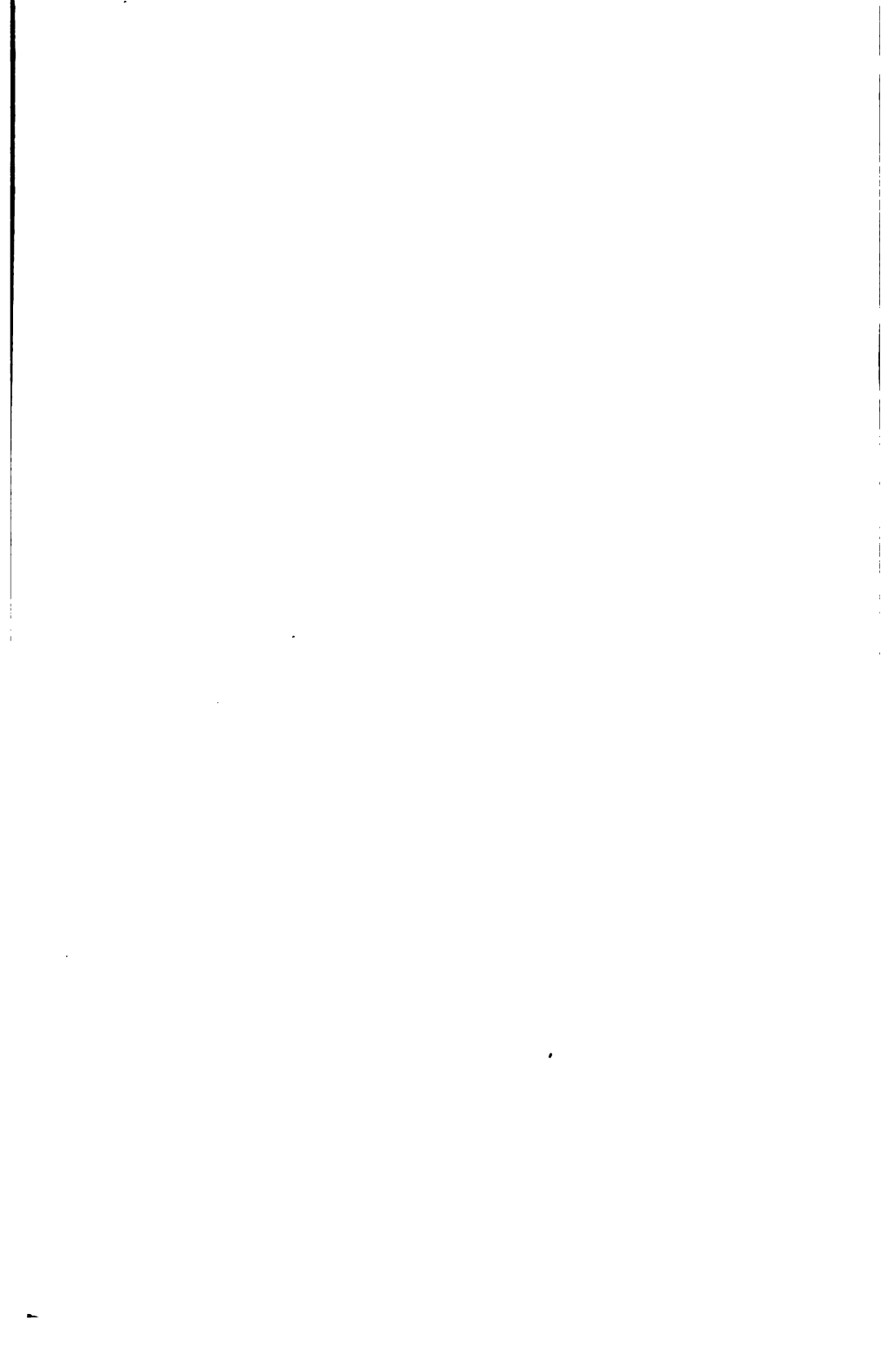
Royal Ann (Napoleon Bigarreau).



Pontiac.



Schmidt's Bigarreau.





Great Bigarreau.

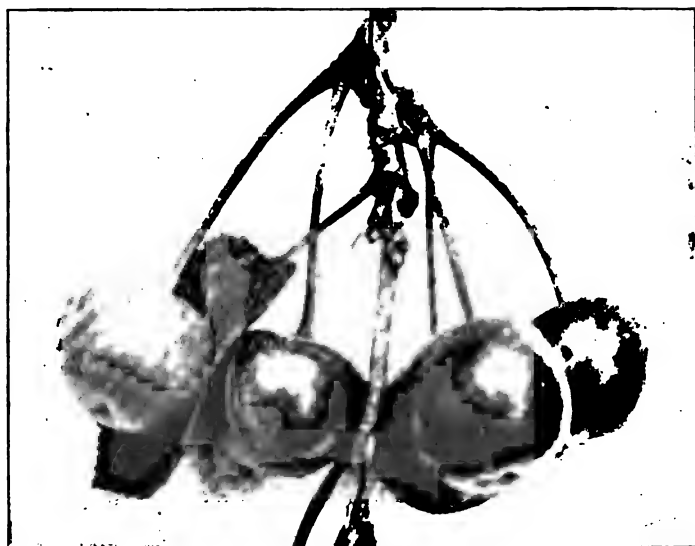


Black Eagle.

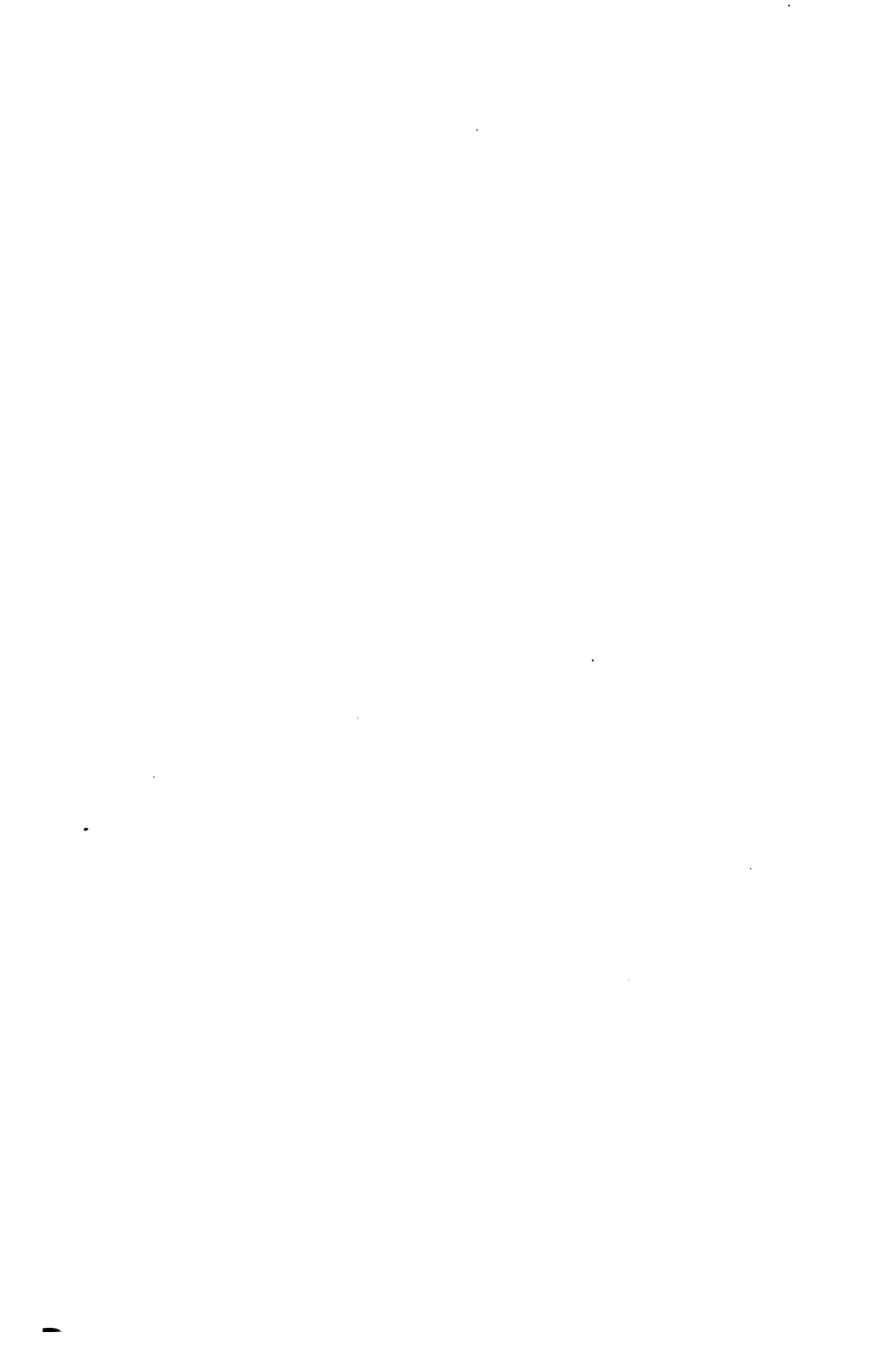




Emperor Francis.



May Duke.





Black Tartarian.



Thompson.



Gov. Wood.



Lewelling.





Knight's Early Black.



Werder's Early.



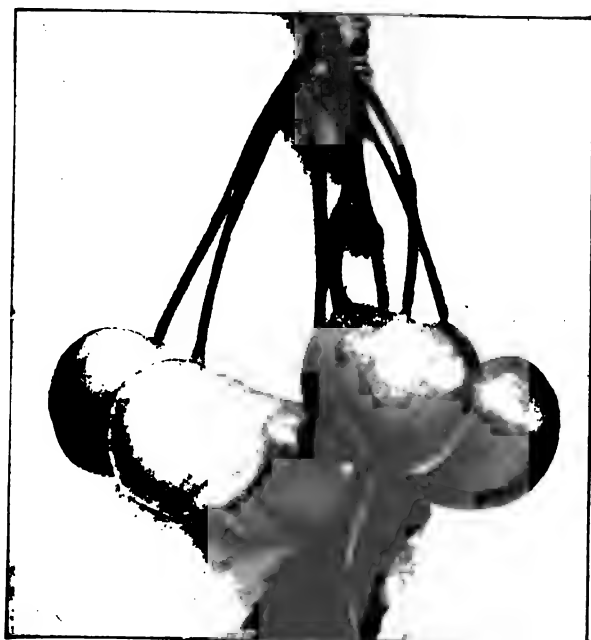
Burr's Seedling



Coe's Transparent.



Black Bigarreau.



Yellow Spanish.



Early Lyon.



Cleveland Bigarreau.



Early Purple Guigne.



Late Black Bigarreau.



Elton.

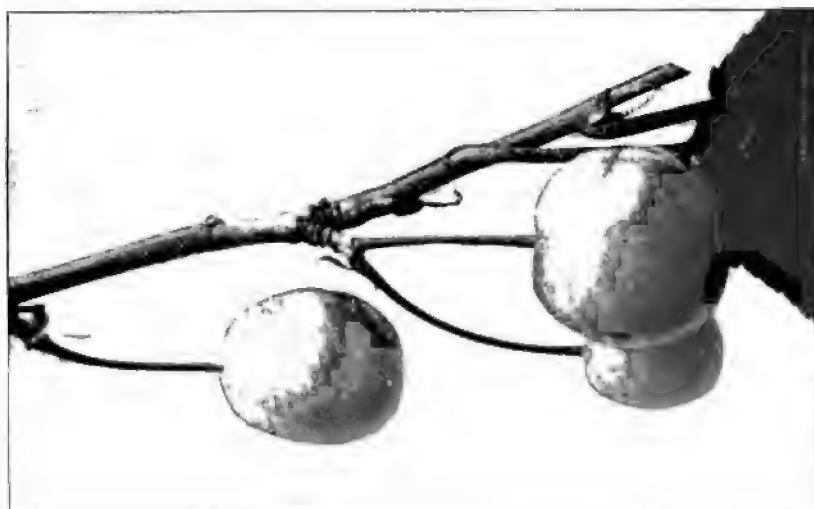


Ludwig's Bigarreau.





Centennial.



Reine Hortense.

are used, and the method of germination is the same as the one previously described for the Mazzard. The Morello stock is also considered very good, and even hardier. Dwarf species are somewhat difficult to bud into; the operation is most successfully performed late in summer, just as the stocks begin to relax in growth.

PLANTING AND PRUNING.

In planting, standard trees are set 30 feet apart or more. After planting, the young trees are cut off 8 to 20 inches from the ground, leaving the last bud uninjured about half an inch from the top. At the second pruning (the season following), three to five limbs, 12 inches long, should be left, cutting off all the rest. On upright-growing trees the branches should be cut to an outside bud, and on those of a spreading habit to an inside bud. At the third pruning cut back one half or two thirds, and thin out to make a well-balanced and good proportioned tree. The fourth and fifth prunings will be about the same, after which but little pruning is necessary. In cutting old cherry limbs it is necessary to cut to a crotch, as the stub will die and likely involve the life of the tree. It is also an absolute necessity to use hot wax or rubber paint on the severed limbs.

By Gilbert Tompkins, of San Leandro.

I have adopted the plan of pruning every other year; I think that is the best plan for any tree that is so apt to run to wood growth, as is the cherry on our rich land. By leaving the trees unpruned there is not that stimulus given to the production of wood, and the energy of the tree is more generally used in forming fruit wood. Downing says that the generally accepted theory of the formation of fruit wood is the ripening of the sap in the limbs of the tree. If the branches are left uncut the ripening process goes on much faster than when the growth of the tree is perpetually stimulated by the cutting of the branches.

By G. M. Gray, of Chico.

Immediately after setting out, cut off your trees 2 feet from the ground, at an angle of 45°, leaving the last bud uninjured, about one half inch from the top; cover the top with hot wax; cut all side limbs. At the second pruning leave three, four, or five limbs, 12 inches long; cut off all the rest; cut to an outside bud on the upright-growing trees, and to an inside bud on the natural, spreading tree. At the third pruning cut back one half or two thirds; then cut to make a well-balanced and good proportioned tree. The fourth and fifth prunings will be about the same. After that very little pruning will be necessary, except cutting out broken limbs, or where they rub or lay in a mat. In cutting old cherry limbs always cut to a crotch, as stubs will die and often kill the entire limb. Be sure and remember the hot wax; it is not necessary on some kinds of trees, but it is on cherry.

CULTIVATING THE SOIL.

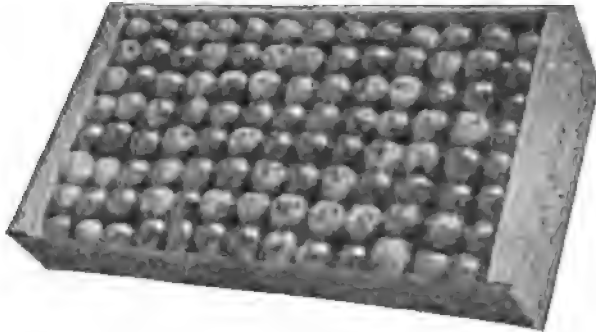
The cultivation required depends very much upon soil and conditions. Some of the most successful orchards are plowed two or three times a year, and cultivators and weed knives are used whenever needed. In looser, more sandy soil, less plowing and cultivating will be required. One of the principal objects in plowing is to form a deep mulch to hold the moisture. Where plowing is neglected and shallow cultivation resorted to, the surface mulch is thin and the moisture of the soil evaporates much more rapidly.

By W. C. Blackwood, of Haywards.

As a general rule, I would say plow your orchard, and if your soil is deep, plow deep and cultivate afterwards with the harrow or cultivator, and allow no weeds to grow. I have had a little experience in that. I purchased a little farm down near Mountain View some time ago, and agreed with the man from whom I bought to take care of the orchard, and about six weeks or two months after I visited the orchard and there was not

a weed in it. He seemed to have done very well, still there was something about it I didn't like, and I went to a neighbor having a little orchard adjoining, and saw that his trees were about as large again as the trees in my orchard. I said: "How long have you had this orchard?" He said that he had been there a year; that his trees came from the same place as mine, and were planted about the same time. I asked him how it was that his trees had made so much better growth. He answered: "He did not plow his orchard and I plowed mine;" and that settled the question in my mind. Now, I agree that there are lands where plowing need not be done. Land that is probably moist does not need much cultivation or much plowing; but on dry soil, whether it be loam or gravel, I hold that it is best to plow, and if your soil is deep, plow deep.

PICKING AND PACKING.



A box of cherries properly packed for shipment, the fruit being arranged in layers.

The picking and packing of the cherry is one of the most important matters in the cherry orchardist's work. The fruit may be extra fine and particularly attractive, yet if carelessly handled in the picking and packed without taste, it will not sell so readily nor bring as good a price as an inferior article properly handled. There is a great difference in the speed with which pickers work, and while some make a toil of picking twelve boxes a day, others with less apparent labor will double this amount. In packing the fruit for market the greatest care must be taken in sorting and facing the fruit to make an attractive display.

The usual packages for cherries hold ten pounds each. These are slipped into chests of twelve each, or packed in crates of four.

The packing is usually done in a tin form, which slips into the box. In this the first layer is carefully arranged in rows with the stems up; upon this layer the other fruit is placed, without regard to regularity, until the form is filled, when it is gently pressed down, not sufficient, however, to injure the tender fruit. The box is then slipped over the tin form and the whole turned over, when the form is removed and the cover is nailed on the box and it is slipped into the chest or crate for shipment to market. Throughout the whole process of picking and packing the greatest care must be exercised so that the tender fruit does not get bruised or damaged.

By G. M. Gray, of Chico.

The picking and packing of the cherry are the most important parts of the business, as carelessness in handling will surely bring ruin, and a clumsy-fingered picker will make them cost a large part of the selling price. I am satisfied we shall have to invent some better way of packing cherries before we shall succeed in shipping to distant parts. The common cherry box will do for all points within four days, but very few that have been shipped more than that have paid expenses. The greatest of care must be taken in sorting and facing to make an attractive and satisfactory package.

DISEASES AND PESTS.

One of the greatest pests the cherry grower has to contend with is the gopher, which evinces an especial fondness for the cherry tree. As the work of this animal is below the surface and out of sight, it is difficult to know the damage he is wreaking until it is beyond remedy. Many large trees in all parts of the State have been girdled by this pest, and the first intimation their owners had of this work was given by the withered leaves and the death of the tree. The best remedy is trapping them, for which several traps have been invented. Another remedy for the gopher is to dig down into his runway and leave there a raisin or a small piece of carrot or celery root, which has been split, and a particle of strychnine inserted. The gophers are very fond of these and will eat them.

Of diseases to which the cherry is subject the principal is the gum disease, in which from some cause the sap oozes through the bark and condenses on the limbs in the form of round masses of gum, sometimes of considerable size. These, unless removed, sometimes induce decay of the bark and wood, and so prove injurious to the tree. Where this disease manifests itself the best remedy is to pare away the outer bark with a sharp knife and cover the wound so made with a varnish of shellac and alcohol. Where the gum accumulates in the crotch formed by the junction of two limbs, as it frequently does, it should be cleaned out, or it forms a receptacle for decaying organic matter, which will cause the tree to decay at the point of lodgment.

VARIETIES.

There are a great many varieties of cherries now in cultivation, and many of them find their way to the markets labeled "Black" and "White," but it would be of much value to horticulturists if the correct names were given. In the illustrations herewith appended are many illustrated for the first time, as are a number of pits, to show the different types from an educational standpoint and for classification purposes; also to show their bearing qualities. Among the most popular varieties are a number of old standard sorts, and some of the best have been produced in our own State.

The *Royal Ann* (Napoleon Bigarreau) is the most popular white cherry and brings the highest market price, as it is valuable for shipping and for the table, canning, and cooking. As all fruits have drawbacks, this cherry has one great fault. It bears well only in situations peculiarly adapted to its growth. In some sections the tree requires age before it gives a paying crop, yet in others it does so well that it is very largely grown. What the exact conditions are that this tree requires is difficult to tell and can only be acquired by experience in its culture.

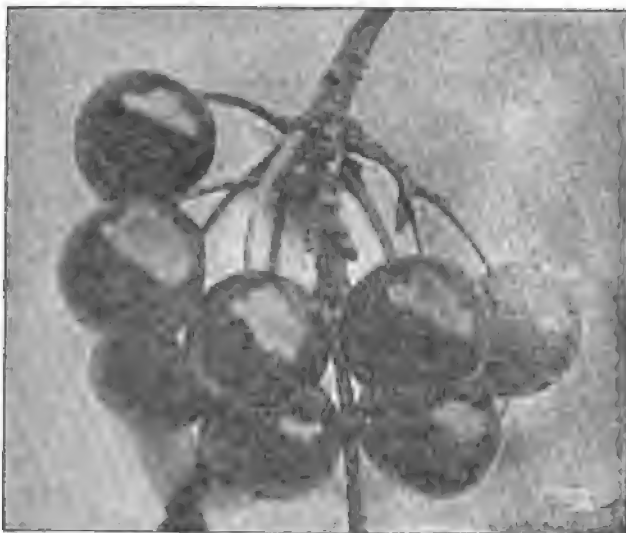
The *Black Tartarian* is the most popular of all cherries and is most largely grown. It is a handsome cherry, and the tree a most beautiful grower and by far the most symmetrical. The fruit before ripe is red, and in this state of ripeness is largely shipped quite early in the season and finds quick sale. The fruit is used for many purposes. It has a good market for shipping, canning, and drying.

Early Lemaire.—This is the earliest cherry in the State. Fruit large, dark purple. Flesh juicy, excellent.

EXPLANATION TO PLATE XXXII.

TYPES OF CHERRY PITS.

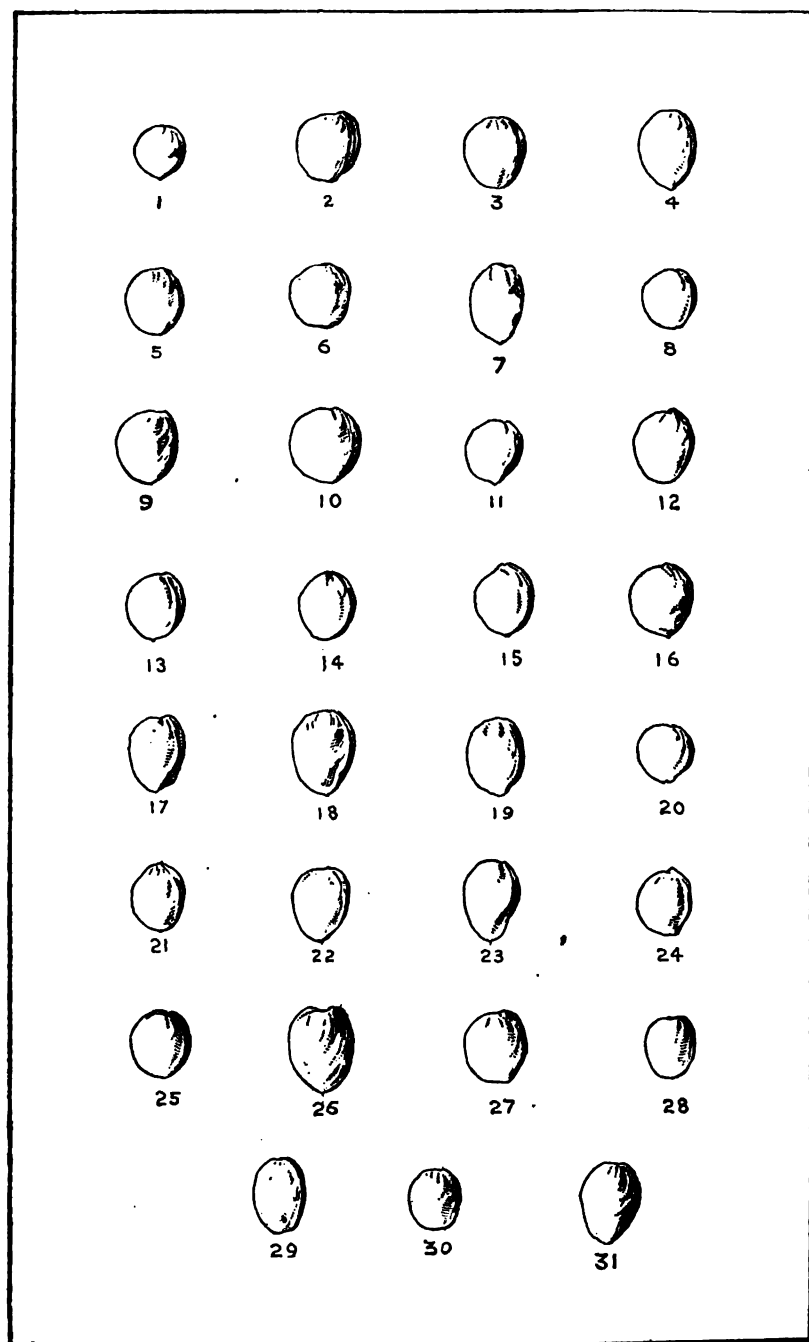
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|----------------------------------|-------------------------------|
| 1. Early Richmond. | 17. Late Black Bigarreau. |
| 2. Thompson's Seedling. | 18. Large Black Bigarreau. |
| 3. Ludwig's Bigarreau. | 19. Monstrous de Megel. |
| 4. Napoleon Bigarreau. | 20. May Duke. |
| 5. Werder's Early Black. | 21. Yellow Spanish. |
| 6. Pontiac. | 22. Bohemian Black Bigarreau. |
| 7. Early Lyon. | 23. Elton. |
| 8. Coe's Transparent. | 24. Knight's Early Black. |
| 9. Centennial. | 25. Cleveland Bigarreau. |
| 10. Grosse rote Knorbel Kirsche. | 26. Reine Hortense. |
| 11. Black Eagle. | 27. Black Tartarian. |
| 12. Schmidt's Bigarreau. | 28. Beaumann's May. |
| 13. Emperor Francis. | 29. Guigne Mabrea. |
| 14. Lewelling. | 30. Guigne tres précoce. |
| 15. Early Rivers. | 31. Burr's Seedling. |
| 16. Governor Wood. | |



Early Richmond.

THE CHERRY.

PLATE XXXII.



Types of Cherry Pits.

The *Early Purple Guigne* is a very early sort; ranks next to *Early Lamaurie* in time of ripening, but in some sections comes in before that variety and is therefore one of the earliest to be seen in the market. Quite early in the season it is shipped when yet red and before turning dark, and brings good prices.

The *Governor Wood* greatly resembles the *Royal Ann*. It is not as good a shipper, but is quite popular with canners. It is a very sweet and handsome cherry, and is perhaps the most highly prized for the table.

The *Burr's Seedling* is another valuable early sort; is a good shipper, and brings good prices.

The *Black Eagle* is a very handsome cherry; resembles *Black Tartarian*.

The *Lewelling* is another valuable sort, both for shipping, canning, and drying.

The *Thompson's Seedling* is one of the best black cherries grown and is very profitable in sections adapted to its culture. In the Alameda and Santa Clara Valleys it does remarkably well and is highly prized.

The *Centennial* is a valuable shipping cherry. It greatly resembles the *Royal Ann*, but is not so bright in color. It is a good bearer and a fair grower.

The *Yellow Spanish* is a beautiful, bright yellow cherry, and very popular for canning.

For cooking, the *May Duke* and *Early Richmond* cannot be surpassed; these are well-known varieties.

Cherries are divided into four general groups, two of the sweet and two of the acid class. These are the *Bigarreau* and *Hearts* of the former and the *Dukes* and *Morellos* of the latter. The varieties in each of these groups merge one into the other, until it is often difficult to distinguish between them. The former group are characterized by the vigorous growth of the trees. The *Bigarreau* are firm fleshed, white, yellow, red, or black in color. Of these the *Napoleon Bigarreau* and *Yellow Spanish* are types. The *Hearts*, usually heart-shaped, have a softer, sweeter pulp than the *Bigarreau*, but are of the same color. Of this class the *Black Tartarian* and *Early Purple Guigne* may be taken as samples.

The *Dukes* and *Morellos* include the acid varieties, and the former hold a place between the *Morellos* and the *Sweets*. The trees are small and generally of an upright growth. The fruit is generally acid or sub-acid, though the sweetest cherry when ripe, the *Belle de Choisy*, is placed in this sub-group. The *May Duke* is a type of this group. There are some very fine dessert cherries among them, if allowed to become fully ripe. The trouble with the *Dukes* is that they are rather watery and tender for cooking, too soft for shipment, and rather acid for dessert use. The *May Duke*, however, comes near being an exception. It is highly prized everywhere, and especially where the climate is a little too cold for the sweets.

The *Morello* group comes last. These are usually small, round-headed trees, with slender, drooping branches and small, thick leaves. This group is divided into two sub-groups, one of which is the *Kentish* or *Early Richmond*, *Early May*, etc. It is a small, round, red, soft, acid fruit. It ripens early and quickly. The fruit, though watery, is highly esteemed for cooking and canning. There are several better, though later, cherries in this group than the *Kentish*. The *Montmorencies*

belong in this group. Their foliage is smaller than either of the other groups. These are the renowned cherry pie-fruits. They are very dark red—nearly black—mostly round, quite firm in skin and flesh, and very acid. Some of them are very rich when fully ripe. They ripen very slowly, and are used for pies weeks before they are ripe. The common Black Morello, the type of the group, is the hardiest and healthiest of our old varieties of cherries. Some of the varieties of this class are red and light red, but none are as good as the common Black Morello. The black English Morello is the largest of the class. The tree is small, conical, enormously productive, late, and very acid, much like some of the plums and American gooseberries—so acid that sugar will not sweeten them.

V.

THE POMELO.

(*Citrus pomelanus*. Syn., Grape-Fruit.)

The pomelo is a variety of the shaddock. There are many varieties in cultivation, and of late have met with great favor in the Eastern markets. The fruit of most varieties vary in size, are generally large, and weigh all the way from half a pound to five pounds. The color resembles that of the citron. Skin very smooth, pulp sub-acid. The tree is very ornamental, has large, deep-green foliage; is semi-dwarf, and a native of China and Japan. There is practically only one variety so far known in the market, and that is the sour, bitter-rind variety. As yet the improved varieties have no commercial standing, because enough have not been grown to make a shipment that would produce an impression. The specimens of the improved sorts I have examined far excel the old-fashioned, sour, bitter-rind variety.

However, the medicinal qualities of the pomelo have suddenly brought it into great favor. Ten years ago there was no sale for this fruit, and it was permitted to go to waste. Now they sell readily for from \$2 50 to \$5 per box, with a steady demand. The pomelo was used for many years in hot climates to correct acidity of the stomach, and other troubles of the digestive organs. For the past dozen years physicians have prescribed them for invalids with disordered stomachs, and in many cases they are a panacea. Many cases are reported here of persons suffering with disordered stomachs being cured in one to two months by the use of the pomelo, and in Florida hundreds of cases are reported.

In a paper read before the Florida State Horticultural Society, O. M. Crosby, of Avon Park, said:

Passing through upper Broadway, New York, a few years since, after a happy winter in Florida, I noticed a huckster with a wagon-load of now popular, then unknown, grape-fruit, or pomelo. He wore a discouraged look as he came out of the houses with samples of fruit which he vainly offered for sale. His countenance lightened as I asked, "How much are those grape-fruit?" and he replied, "Well, I am glad there is one man in New York who knows what they are. I can't sell them," and I happily carried home a sack full at the rate of "eight for a quarter."

To-day what a change, and how suddenly popular has become this almost unknown, healthful fruit. While oranges have gone begging at \$1 per box the past three months in Jacksonville, grape-fruit have readily brought \$2 per box. They thrive with less trouble, and are equally as prolific as the orange.

Moral: Plant more and better grape-fruit.

The culture of the pomelo has extended over a wide range of country, often in a wild state.

The Florida "Exchange" says:

The great value of grape-fruit is not generally known outside of Florida, although in some of the larger cities the sale is quite large and increasing. Its valuable medicinal qualities are rapidly bringing it into notice and demand. We have known its use to cure dyspeptic troubles, constipation, and other diseases of the stomach and bowels. The daily use of grape-fruit for a month will cure the most obstinate cases of indigestion and bring all the digestive organs into action. Some people do not like them at first; this is because they do not know how to prepare them for eating. It is better to eat them just before meals or with meals as sauce. Hemispherize them and squeeze out the juice into a tumbler. In this way you avoid the bitter in the rind. Some prepare them for the table by peeling them thin, dividing them by segments, then peel the segments of the thin skin (rag). In this way you also avoid the quinine. By many people in Florida they are preferred to oranges. They are always refreshing. The demand is greater than the supply, and the prices run better than oranges. It is said that the sweet grape-fruit has not got the medicinal quality found in the other kind. Whether this be true or not we do not know from experience.

Ed. Rumley in Florida "Vineyardist" gives the following method of using the pomelo:

The way to use them so as to avoid the bitter in the rind is to cut them in halves and squeeze the juice into a tumbler, or to suck it as it flows by squeezing; or to peel it and take out the sections and remove the membrane about the sections, which is easily done if commenced where the seeds are.

The Florida "Farmer and Fruit Grower" says:

People eat the pomelo as a breakfast relish for its acidity and its tonic quality—putting on plenty of sugar, however—and the sweet pomelo has no character any more than a sweet lemon has. It is a very agreeable fruit to eat, no doubt, but it is not medicine. There is no telling, however, what the vagaries of fashion may devise. The one fact you want to keep fixed in your mind is that, if you raise pomelos which are of a pale lemon yellow, superlatively bright and speckless, they will sell for good money, no matter what the variety.

The following interesting sketch of the pomelo is given by James Mott, in the Florida "Agriculturist," of November, 1893:

One naturalist (Seeman) says: "It is extremely common about the Fiji Isles, and covering the banks of the rivers." De Candolle says: "In China one species has a simple name, Yu, but its written character appears too complicated for a truly indigenous plant." It is said to be common in China and Cochin China, and that in the islands to the east of the Malay Archipelago the clearest indications of a wild state are found.

"Shaddock was the name of a captain who first introduced the species into the West Indies." The name pomelo and grape-fruit are more than likely local names given it since it came to Europe. Pome is the name of any fruit, the inside of which is divided. Webster says, "a fleshy or pulpy pericarp," which is very marked in this fruit. The name grape-fruit likely comes from the form the fruit takes on the tree, being produced in clusters, often twenty or more of the fruit in a bunch; it is surprising the loads of fruit this tree will produce. There are three distinct forms, though; while they are all shaddocks, the names of them somehow have become divided; the larger form is called pomelo, then shaddock, from the red color, both of skin and fruit. I am at a loss to know whether this was one of the distinct forms imported by Captain Shaddock, as De Candolle, in his "Origin of Cultivated Plants," makes no mention of it. While I have no data, I think its introduction is later than that of the orange, as in no case have I found the grape-fruit wild, which is the case of both the sweet and bitter-sweet oranges.

There have been several importations since the real settlement of this country, from India and other sections, but in no case have I found them to be improvements over those first introduced. There have been, however, very decided improvements of our own origin in the last decade. The form in some instances has become somewhat changed; the size less, skin thinner, with less seed and rag, and the quality changed from the pungent acid of the old form to that of a "delicious," sweet fruit. All of these, so far as I have seen, are chance seedlings, and some of them, after it was found they were better, have been more or less preserved by budding.

I am very much inclined to the belief that often they are accidentally crossed with the orange. One I might mention, the Aurantium pomelo, as the name implies, partakes of both the sweet orange and the shaddock. It is said to have been an orange tree that produced it. The trees take the form of the orange, while the fruit is produced in clusters; in form not quite so much flattened, but it is that of the grape-fruit. In quality, to many tastes, it is superior to the orange. The bitter principle of the shaddock is



Cherry orchard in Alameda County, in full bearing, and showing method of pruning.



Four-year-old Black Tartarian Cherry orchard in Butte County, showing habit of growth and method of pruning.



Cherry orchard in Santa Clara County, in full bearing, and showing method of pruning.



Four-year-old Early Purple Gague Cherry orchard, showing habit of growth and method of pruning.

somewhat retained, but it is covered up with the sweets and acids, and so nicely blended that it makes a fruit more rich, with a decided tone over that of the orange.

Should I attempt to account for these changes that have come since its introduction into this country, it would be speculative, yet, I believe, correct. Our very peculiar climate, which I know in other instances has brought about pomological changes that scientists of other sections have told us could not be, has caused this remarkable fruit to become crossed with the orange, until in it we have not only the health-giving principle of the parent grape-fruit, that is so highly spoken of by our best physicians, but the luscious sweet orange of Florida.

In the markets for our oranges there is a rapidly increasing demand for the grape-fruit, and I can but believe that with the introduction of these improved varieties, the demand will so increase that it will be more sought after than our famed orange.

While one of our agents was traveling abroad, I instructed him to collect seeds of all the varieties of pomelos with which he would come in contact. He did so, and supplied me with seeds of different species. These seeds were distributed among fruit growers throughout the State for experiment, with the hope that improved sorts may be thus obtained. In all his travels he reported having found no fruit of the pomelo without seeds. My idea was that if a seedless sort could be found, I would spare no pains to have buds of it introduced and distributed throughout the State. The main objection to the pomelo is the great number of seeds the fruits contain, and a seedless sort would no doubt prove a great acquisition. While writing, the following interesting article from the Bartow (Florida) "Progress," on a "Seedless Pomelo," is handed me, which will no doubt interest many contemplating planting the pomelo:

Mr. C. M. Marsh, of Lakeland, has a new strain of grape-fruit, or pomelo, which possesses the remarkable characteristic of being seedless. Mr. Marsh is one of those painstaking fruit growers, pursuing his experiments along scientific lines, with unwearied patience and intelligent observation, to whom the State is so deeply indebted for many improvements in the quality, flavor, and variety of our home-grown fruits. This newest development promises to make for itself a foremost place among our fruits. The grape-fruit, or pomelo, is rapidly growing in popularity in Northern, Western, and foreign markets, and all who know the fruit will concede that it has qualities which fully justify its growing popularity. As at present known it is an abundant seeder. The consumer, or the cook who prepares the fruit for the consumer, finds the seeds somewhat of a nuisance, and will at once recognize the advantage of getting rid of them. When it becomes known that, with the absence of the seed, the interior skin of the fruit becomes thinner, the juiciness increases, the flavor improves, and the fruit retains all its good qualities in an enlarged degree, fruit growers will be ready to acknowledge that Mr. Marsh has got hold of a valuable thing. The matter has now proceeded beyond the range of experiment into that of certainty, as Mr. Marsh has now young trees of the new variety in his nursery that are bearing abundantly, and all true to the strain. The pulp is somewhat darker than the ordinary grape fruit, but the rind has that peculiar, bitter flavor which is so highly esteemed for medical purposes. The average size to which the fruit attains requires it to be packed fifty-four to sixty to the box.

Consul Woodrow, in his report (Fruit Culture in Foreign Countries, 1890), says:

The Pomelo.—Seedlings of this fruit vary greatly, and a large proportion are worthless, but the grand, thin-skinned, and red-fleshed varieties that are cultivated near Bombay are very delicious and wholesome if eaten in the morning with salt and sugar. A well developed specimen weighs 4 pounds and is 7 inches in diameter. It has 14 or 15 liths, seeds few, or sometimes none, embryo one in each seed. The tree thrives in a hot, moist climate, and needs the strongest of nitrogenous manures. Near Bombay slaughter-house offal is freely given as manure. Inarching on to a seedling pomelo is the means employed for propagation, and regular irrigation, when the rainfall is below 4 inches per month, is provided.

The pomelo is now marketed under the name of "grape-fruit," which is a misnomer. This is confusing and misleading. The name "grape-fruit" was given to this fruit in Florida, as it hangs on the trees in clusters resembling the grape, but has no relation to it whatever. Growers and shippers should drop the name "grape-fruit" and apply to it the name *pomelo*, which is popular, and botanically correct.

REPORT
OF
I. H. THOMAS,

Commissioner for the San Joaquin District.

VI.

REPORT OF I. H. THOMAS,

Commissioner for San Joaquin District.

To the honorable the State Board of Horticulture:

GENTLEMEN: Herewith I submit for your consideration my report as Commissioner for the San Joaquin District, which includes the counties of San Joaquin, Stanislaus, Merced, Fresno, Tulare, and Kern, and also the newly formed counties of Kings and Madera.

It gives me pleasure to report that throughout the whole district the past season has been a very prosperous one, and while, in common with the rest of the Union, we have felt the effects of business depression and stringency in the money market, resulting in low prices for fruit, our crops have been large and our fruit of superior quality, and less complaint is heard among our orchardists than among any other class of producers. The raisin crop, which is the principal among the fruit crops of the San Joaquin district, has been especially good, and the yield much larger than the average. The season has been very propitious and enabled the growers to save both the first and second crops, both of which were large in yield and fine in quality.

The yield of deciduous fruits has been fully up to the average, and prices have averaged good. Early and late peaches, which reached the Eastern market when it was bare of domestic fruit, brought excellent prices. Those shipped, however, in the season when the Eastern fruit was ripening, did not pay so well, although, so far as I can learn, there was no loss even on those shipments.

A great drawback in the shipment of fresh fruits from the southern part of the San Joaquin district lies in the difficulty of reaching the Eastern market, and the unsatisfactory time made by the railroad. When to the promised five days' time from Sacramento, which is often extended to ten or twelve, we add the no schedule time from interior points to Sacramento, in which the fruit has to linger en route at the pleasure of the railroad employes, it will be seen that the southern portion of my district is very heavily handicapped in the green fruit market, so much so that the counties of Tulare, Kings, and Kern are practically barred from competition. As a result, the larger part of the fruit product of the San Joaquin district finds its way to market in the cured form.

The area of new land set to fruit during the past season has been very large, and much attention has been paid to citrus fruits. What is known as the "thermal belt," is a region of country in the foothills above the cold and chill of the valley, and below the frost line of the mountain regions. It varies in altitude from 500 to 2,000 feet, and in width with the contour of the country. In this section frost is absolutely unknown, and disagreeable or destructive winds infrequent. All the conditions required for citri culture are found here, and are now being taken

advantage of by our horticulturists. Extensive plantings of oranges, lemons, and limes have been made, especially around Porterville, in Tulare County, which has become the center of the citrus belt of the San Joaquin Valley. In this region lemons appear to be the favorite, and at Limekiln, Lindsay, Orosi, and other points in this thermal belt very extensive plantings have been made in the past season. These are warranted by the fact that both lemons and limes have been bearing here for years and no frost has ever yet destroyed or injured the crop, and further by the excellence of the fruit produced in this section, which carried away the first prize in competition with all of Southern California.

One great advantage possessed by this district is its comparative freedom from insect pests. The red and yellow scales, those destructive pests of the orange and lemon grower, have never obtained a foothold in the San Joaquin; the black scale cannot stand the hot days of our summer months, and the pernicious scale, the principal one which troubled us, has disappeared before the friendly parasite which has been working so assiduously upon it, that it is now difficult to find it. Among the beneficial insects at work I have especially noticed the brown-necked scymnus, the twice-stabbed ladybird, and a little chalcid fly. There are other parasites at work, and so effective are their labors in ridding our orchards of pests that little if any spraying will be done in many parts of the district this season.

IRRIGATION.

A matter worthy of especial note is the extension of vast irrigation works in the San Joaquin Valley. Many of the larger works have been in operation for years, and the results have been so good that new ones have been projected and the capacity of the old works enlarged. This results, naturally, in the reclamation of very large areas of arid lands, and in many instances those lands which were useful only for the production of cereals have been made valuable for fruit.

During the past year there has been organized a canal project for irrigating a large area of land on what is called the "West Side," the territory on the west side of the San Joaquin Valley, in Fresno and Kings Counties. This region is unsurpassed in the State for fertility, and will, when developed by the addition of water, become very productive and add largely to the taxable wealth of the State. Heretofore the great problem has been how to get water onto this country cheaply and successfully. As there were no streams traversing this region carrying water sufficient for the purpose of irrigation, it may be readily inferred that the engineering problem involved was very important.

The Summit Lake Water Company, composed of men of means, energy, and experience, have tackled this problem, and are now engaged in building their canals and putting up vast pumping works, for the purpose of elevating the water to a height of 20 feet, and propose, by means of a system of distributing canals, to irrigate an area of about 60,000 acres. They have had two immense centrifugal pumps constructed—the largest ever built on this coast—each having an inside diameter of 44 inches, with capacity to lift 100 gallons per second 20 feet high. They are propelled by compound condensing engines of two hundred and forty horsepower. The pumps and machinery have been made with great care by Mr. ~~Person~~ Jackson, of San Francisco, a man who has had large experience in kind of machinery. I am sure that if this enterprise proves a suc-

cess many similar ones will follow, where like conditions exist, throughout California. Fuel is cheap in the country where the Summit Lake Company are operating, and the well-known ability of the gentlemen who are conducting this novel experiment precludes the elements of uncertainty generally attendant on such ventures. I make this report for the purpose of calling attention to this kind of irrigation, as an object-lesson to those who may consider themselves unfortunate in the matter of location, that they may investigate the subject and perhaps discover a remedy for many localities heretofore thought to be useless.

Other notable irrigation works completed since my last report are the Pine Ridge Flume, east of Fresno, and a canal from Kern River to the "Weed Patch." The former was constructed for the double purpose of conveying lumber from the mountains east of Fresno and delivering water for irrigation to a large tract of rich land—some 60,000 acres in extent. The putting of water on the "Weed Patch," in Kern County, also opens to cultivation a large body of as fertile land as can be found in the State. As the greater part of all this land reclaimed by means of irrigation will in time be set to fruit trees, it will be seen that the orchard area of the San Joaquin district will be very largely increased by these enterprises.

In Stanislaus County, the joint irrigation dam of the Modesto and Turlock irrigation districts, across the Tuolumne River, near La Grange, was completed after two and one half years' work. It is the highest overflow dam in the world, being 110 feet high. At the base it is 96 feet wide, and at the top 15 feet. It is in the shape of an arch, and is 236 feet across the top. It cost about \$550,000. The dam will supply water to 276,000 acres of land in Stanislaus County. Canals on both sides have been partially finished, the total work so far costing \$1,800,000.

FRESNO COUNTY.

The assessment report of Fresno County, which is below the actual figures considerably, gives the following:

<i>Acres in Grapes.</i>		Bearing.	Non-bearing.
Table.....	142		
Raisin.....	25,782		12,812
Wine.....	1,966		
<i>Number of Fruit Trees.</i>			
Apple.....	8,626		6,159
Apricot.....	84,930		29,139
Cherry.....	376		894
Fig.....	10,811		19,205
Olive.....	6,317		16,346
Peach.....	120,020		205,939
Pear.....	47,924		63,115
Prune, French.....	5,258		28,912
Prune, other varieties.....	4,156		24,550
Lemon.....	55		805
Orange.....	429		11,967
Almond.....	334		3,344
Walnut.....	1,565		571
Nectarine.....	104		125

These figures, indicated by the large increase in non-bearing trees, show a very large area planted to new orchards in the past two years. This is especially noticeable in the returns for oranges, figs, and olives,

to which fruits much attention is now being directed in this as in the adjoining counties. Olive culture is coming in for a very large share of attention, and the superior conditions in soil and climate and freedom from pests in this section, amply justify the faith of those who have gone into this branch of horticulture.

With regard to the characteristic industry of this county—the raisin—I have to report that this has been the best season for drying on record, notwithstanding the low temperature, and consequently slow drying. The shipments last year were 2,200 carloads of ten tons each. This year the shipment, at the date of writing, has already reached over 1,750, and conservative estimates place the crop at 2,600 to 2,700, some going even two or three hundred carloads higher.

The fig crop of Fresno this year has been large, one packing-house having shipped over 100 tons of unsulphured figs to fig syrup factories; while another has sold of his own over 60 tons, besides packing and handling large amounts for customers. As yet no figures are obtainable, but about 250 tons have already been shipped. Mr. Mitrovich has also made a large pack for Col. W. Forsyth and others in ten-pound boxes, and being an expert from the Adriatic coast has had great success. He claims the product equal to the Smyrna if properly handled.

BENEFICIAL INSECTS.

In answer to a letter of inquiry regarding the work of parasites in Fresno County, a prominent fruit grower there writes me: "I cannot speak too highly of the salutary effect upon the fruit industry of this county, directly attributable to the introduction of insect parasites. Your Commission has done well, and it is hoped the work will continue until we shall not be compelled to waste the net profits of our orchard crops to spray trees with expensive and unsatisfactory pest exterminators, but shall leave that work to the inexpensive parasite. The search for other pest destroyers should be persisted in, for beyond question they are the logical remedy for pests of all kinds, and that in some form or other the requisite parasite exists."

KINGS COUNTY.

Kings County was a part of Tulare, and was formed into a separate county by the last Legislature, and heretofore the report of the horticultural resources has been embraced in the reports of Tulare County. While there is a large acreage in deciduous fruits, the cultivation of the raisin grape is the principal industry of this county. There will be shipped from Lemoore, Armona, and Hanford about 550 carloads of raisins this season. The grade of goods ranks as high as in any part of the State, and the amount produced per acre is perhaps higher than in any section so large as this in California. There have been shipped from Kings County this season 150 carloads of green fruit and 100 carloads of dried—mostly peaches and apricots.

INSECT PESTS.

Insect pests, except codlin moth and yellow mite, have done but little damage to our trees, vines, or fruit this season. The brown-necked scymnus and the lace-winged fly have almost destroyed the San José

scale. The twig borer, strawberry root borer, or peach worm—all of which are names for the *Anarsia lineatella*—has done some damage to peaches by boring into the stem of the peach and rendering them unfit for shipment. Arsenic compound sprays have saved the pears, but a large portion of the apple crop was lost by the codlin moth. The yellow mite has done the prune orchards great damage this season, stripping the trees of their foliage in July and August, thereby exposing the fruit to the sun and checking the growth of the young trees. They feed upon the forest trees, and indeed upon almost everything, and threaten to be a great nuisance. No remedy has been more effectual than a spray of cold water applied to the under part of the leaf with force enough to break the web. The State Board of Horticulture could not do a better work than to have this insect studied, and its parasite, if it has any, and bring out, if possible, something to destroy it. The difficulties in the way are the habits of the insect. It does not eat the leaf, but feeds upon the juice of the plant, therefore you cannot poison it. If I am not mistaken in my observations, it does not lay its eggs like many other insects, but they are hatched in the body of the dead mother, and are protected by the web while young.

TULARE COUNTY.

Tulare County has kept pace with her sister counties in the San Joaquin Valley, and the past season has witnessed very large areas of new land set to orchard. The division of the county and the setting aside of a large part of the new county of Kings has, of course, reduced its orchard area very largely, as the portions removed included some of the finest and most densely planted orchard lands in the county. The principal fruit sections in Tulare County are now Tulare, Traver, Visalia, Farmington, Orosi, Porterville, Plano, Lindsay, and their immediate surroundings. In this district there has been no loss of faith in the future of fruit growing, and very large quantities of both deciduous and citrus fruits have been planted in the past year. Prunes have been the favorite, the large yield and excellent curing qualities of this fruit giving an incentive to its planting. This has been seconded by the early age at which the trees come into bearing. The uniformly cloudless and hot weather during the drying season are also great inducements in the way of prune culture, and the growers of Tulare County assert that they have there perfect conditions in soil and climate for the fruit. Peaches do equally well and the crop of the present season has been exceptionally large. A very large part of this crop has been cured and is still in the hands of the producers.

Much attention is being directed to olives in different parts of Tulare County, especially in the foothill regions, and this fruit does exceptionally well. In a few years Tulare will add her annual quota of olive oil to the product of the State, and aid in making what is now a respectable industry an important one.

Considerable experimental work has been done with figs, and while some very fine samples of figs have been packed, many of our growers have to contend with the fungous growth in the Adriatic fig, which causes the young to sour. When we discover a remedy for this trouble another very important fruit industry will be inaugurated in Tulare.

The extension of her irrigation systems and the vast abundance of

water for irrigation purposes supplied by the perennial streams from the Sierra Nevada Mountains, make Tulare one of the most fertile counties of our State. For many years her extensive plains were used only for the production of the cereals, but with the introduction of water wider and wider areas were set to orchard, until to-day she takes her place in the front rank of the fruit-producing counties of California; and in the wide range of her productions, which cover all, from the hardy apple of the northern clime to the tender lime and pineapple of the tropics, she cannot be excelled by any county in the State.

MERCED COUNTY.

Merced County has made rapid strides in horticultural pursuits in the past few years, encouraged by the construction of the Crocker-Huffman canal, which made a large section of excellent fruit land available for cultivation. Since the date of my last report there have been many new orchards planted here, and many of those formerly planted have come into bearing, until to-day Merced takes her stand among the principal fruit-producing counties of California. This county presents a very wide range of soils, including the rich alluvium of the bottoms; heavy red adobe, free from and mixed with gravel; loam containing sand and gravel; and a very sandy loam. With such variety of soil, its climate, and an abundant water supply, Merced is rapidly coming to the fore in the production of a very wide range of fruits, both citrus and deciduous. The yield of peaches and apricots is reported as more than usually large this season, and the fruit was very fine. At the Rotterdam Colony the canning company put up a large quantity of canned fruit for the Eastern market, and a much larger quantity was dried.

Raisin growing is the principal horticultural industry of Merced, and a very large area of new land has been set to vineyards during the present year. The crop this season is reported as very large. Large shipments of fresh grapes were made to Chicago during the season, but the greater part of the grape crop was dried. Much attention is being directed to citrus fruits here, and in many localities the lemon has been found to do well, while the orange flourishes over a large part of the county. West of Merced City are several orange groves, which look as healthy and produce as fine fruit as any I have seen in the State. A correspondent writes me in regard to the olive in Merced:

"The olive is the pride of our horticulturists. Next year there will be planted thousands of acres in addition to the many hundreds of acres of trees now loaded with this noble fruit. There is no soil or climate upon the earth better adapted to the growth of the olive than that of Merced County. The fruit covers the whole tree, and the present crop, which is flatteringly promising, will be gathered about the first of December. At the late district fair held in Merced, M. D. Atwater had an exhibition of several bottles of olive oil as fine as any ever imported from Europe.

"Most noticeable among the products of this county, not indigenous to the soil, is the rapid growth and variety of nuts. Many of our farmers are meeting with complete success in the cultivation of English walnuts, almonds, black walnuts, peanuts, and chestnuts. Among the varieties of chestnuts the Italian is the favorite. It is more than twice the size of the American chestnut, and of a much richer flavor.

"The Buhach Company is now largely engaged in horticultural indus-

tries, and is fast becoming noted for its production of fine fruits. The colonies north, south, and west of the city are being rapidly peopled with well-to-do families from the East and from different parts of Europe, and horticulture in all its branches is in a healthy and progressive condition. Water from the Crocker and West Side canals is attainable at all seasons of the year, in quantities to meet the most extravagant demands. There will be a large quantity of canned, dried, and ripe fruit sent to the Midwinter Fair, which will doubtless compare favorably with the fruits from any other county on the coast."

STANISLAUS COUNTY.

Very marked improvement has been made in Stanislaus County from a horticultural standpoint during the past season, and here, as in the other counties of my district, numbers of new orchards have been put out. Not so much attention has been paid to fruit as to wheat in this county in the past, but the low prices of cereals of late have had the effect of turning more attention to fruit growing. In the foothills of Stanislaus County some very fine oranges are grown, and much attention is now being paid to citrus fruits. In the higher portions of the county, too, some remarkably fine apples are produced, while in the lower portions peaches, prunes, and pears do well. Raisins have been tried to some extent and have done well.

KERN COUNTY.

In Kern County considerable new planting has been done in the past season, largely in peaches, prunes, apricots, and raisins. Some very choice fruit has been produced here, that from the orchard of C. A. Maul, near Bakersfield, having won general admiration at the Chicago Fair.

SAN JOAQUIN COUNTY.

In San Joaquin County great activity has been shown during the past season, especially in the vicinity of Lodi, which is rapidly becoming the heart of the fruit section of this county. San Joaquin is favorably situated in having water communication with San Francisco, and in being a terminal point on the railroad, and hence has the advantage of easy and cheap transportation to market. Very large quantities of fruit from this county have been shipped both to San Francisco and the East, and fair prices generally have been realized during the season.

REPORT
OF
ALEXANDER CRAW,

Quarantine Officer and Entomologist.

VII.

ENTOMOLOGY AND QUARANTINE.

By ALEXANDER CRAW, Quarantine Officer and Entomologist.

To the honorable the State Board of Horticulture:

GENTLEMEN: Since my last report forty-nine steamers and sailing vessels have arrived in the port of San Francisco from foreign countries, having on their manifest, or in the possession of passengers or crew, plants or trees that required inspection. As this covers the summer season, the fact that 153 cases and boxes were received, would indicate that the demand for something new still continues, notwithstanding the heavy loss to several importers within the past few years, who had pest-infested or diseased trees or plants. However, a very decided improvement has been noticeable in their freedom from insects. This would indicate a more wholesome regard for the laws and regulations governing the same. Most of the stock received during the summer are ornamental trees and plants. The season for fruit trees is from the end of November until the middle of April. The countries from which the above vessels arrived are China, Japan, Mexico, Central America, Australia, New Zealand, and Hawaii. The great bulk of the plants came from Japan. The Japanese are noted for their quaint flowers, dwarfed trees, and shrubs, and lovers of plants visiting that country generally bring a collection on their return. This is a source of great danger, as such people know nothing about our laws and use no care in selecting healthy plants.

Besides frequently finding the insects referred to in former reports, the following kinds were found and destroyed: On Sunday, June 18th, the steamship "City of Peking" arrived from Japan, having on board a case of plants from Singapore, India, four of which were cinnamon trees, infested with a dark gray wax-scale of the genus *Ceroplastis*, one eighth of an inch long and nearly as wide. They have a raised, convex body, with a small brown spot in the center, and two white oblique lines on each side of the scale. They differ greatly in color and size from the *Ceroplastis* frequently found on Japanese plants.

On June 26th, the steamship "China" arrived from Japan, and had six pot-grown cherry trees that were infested with a bluish-gray aphid. They were so numerous that the young wood for its entire length was completely covered. The leaves were free from them, but covered with honey-dew and fungus. I believe this would be a serious drawback to cherry growing if they obtained a foothold in California. The trees were dropped overboard. On the same steamer I found a deciduous magnolia infested with black scale (*Lecanium oleæ*). I mention this to show the existence of this pest in that country, although I do not think it has a very wide distribution there, or I would more frequently find it.

On June 28th I found five oleanders on the steamship "Australia,"

from Honolulu, infested with a small circular, spiny scale, probably an *Aspidiotus*, but the rough spiny dorsal scale is something new. The effect upon the wood of the oleander from the attacks of this scale is the opposite to that produced by the "mining scale" (*Chionaspis biclavis*), which was found on the Tahiti orange trees that were condemned and destroyed over two years ago. In this case the wood appears to be poisoned immediately surrounding the scale, and does not expand as rapidly as the part not attacked, thus causing a depression instead of a swelling, as in the case of the "mining scale." These plants were burned.

Another scale from Japan was found on camellias that arrived on August 2d on the "Rio de Janeiro." This was rather a pretty, small, white insect, infesting the leaves and wood, and resembles a *Ctenochiton*. The plants were thrown overboard. On the same plants I found a number of tortrix larvæ that were devouring the leaves. On an invoice of Japanese pine trees I found several lepidopterous larvæ that had rolled up the leaves and destroyed the tips and terminal twigs.

On August 4th the steamship "Monowai" arrived from Australia with a case of plants for the Department of Agriculture, Washington, D. C. In the case were several orange trees slightly infested with "red scale" (*Aspidiotus aurantii*). The trees and plants were very much shriveled by drought. I watered them and wrote to Secretary Morton of the existence of the red scale on the orange trees.

On the same steamer there arrived a more conspicuous enemy of the orchardist than the harmless appearing scale bug. This was a "flying fox" (*Pteropus rubricollis*), that was making a breakfast on a banana and a ripe pear. It was driven out to sea and took refuge in the rigging of the steamer soon after leaving Australia, and, after an exciting chase, was captured by one of the passengers, who brought it along as a pet, and who was very much annoyed when I informed him that I would not allow it to be taken ashore alive. I procured an ounce of chloroform and a sponge. After tying the latter to a stick I saturated it with chloroform and applied it to the nostrils of the fox. She soon dropped to the bottom of the cage, where I placed the sponge to its nose and left it for one hour. The body of this specimen was 14 inches, with a wing spread of 3 feet 2 inches. Next to the rabbit, the flying fox is considered the most serious pest in Australia.

The July (1890) number of the "Agricultural Gazette," of New South Wales, contains a very interesting account of experiments that were conducted—under the orders of the Ministers of Mines and Agriculture—in destroying flying foxes by means of dynamite and other explosives. In order to show the possible danger from the introduction into the State of such a pest, I will give a few extracts from the "Gazette":

The Minister has long recognized the extent of the depredations committed by these animals, and also the difficulty of coping effectively with them. The damage done every year to the orchards in the coast district must be estimated at many thousands of pounds. The haunts are numerous, and contain millions of foxes, which sally out night after night to pick the choicest morsels of the choicest fruit in the orchards, within a radius of 20 miles of the respective haunts.

The Minister having received urgent requests for help from thirty different fruit-growing districts, determined to assist any parties organized to attack the animals in their haunts, by supplying the ammunition. The result was a considerable expenditure of powder and shot, and a destruction of perhaps one hundred thousand foxes, at an average cost of £1 for one hundred and fifty. It was soon seen, however, that spasmodic attacks in isolated districts would not sensibly diminish the pests, but merely split up large camps into small ones. It must be attacked in a systematic and wholesale manner. The reports of fifteen hundred killed in one tree by the explosion of one pound of dynamite was very alluring and experiments were ordered.

An interesting account of the experiments is then given, but the unanimous opinion of those who witnessed the experiments was that the destruction of flying foxes on a large scale by explosives is impracticable. The foxes spend the day in oak and other trees that afford shade. The absence of such trees in the immediate vicinity of an orchard is no guarantee of immunity from their depredations, as they are known to fly over twenty miles during a night. Various devices are used to protect the fruit; some use wire netting, and others stretched wire attached to poles over their trees, which cuts the membranous wings of these animals, causing them to fall and they can then be destroyed. They are especially fond of peaches, but all soft fruit is eaten by them.

On October 10th four more flying foxes arrived on the steamship "Rio de Janeiro" from China, and were destroyed.

On August 15th the steamship "Gaelic" arrived, and an ornamental plant in the possession of a passenger was found infested with *Rhizzicoccus*, new to the State, and was destroyed.

On September 15th the steamer "Newbern" arrived from Mexican ports, and had on board 1,157 boxes of oranges from San José del Cabo, that were infested with the "long scale" (*Mytilaspis gloverii*). I immediately served quarantine papers on the importers, and also notified the steamship company not to deliver said oranges until the law had been complied with. The importers refused to disinfect or fumigate the fruit and abandoned it to the Government, after having paid the freight. After nine days it was sold by the United States customs officials, for duty, and bought in by L. G. Sresovich & Co., of San Francisco. Just before the sale took place the people in attendance were informed that whoever bought the fruit would be required to disinfect it before it was delivered. After the sale the fruit was again quarantined. As the dock is roofed it gave the necessary shade, and the work of fumigating was done in the daytime. Six days were required to do the work. An airtight canvas was spread over the dock floor, to prevent the gas from escaping. On the top of this were placed 2x4-inch scantlings 16 feet long; on these were placed 4x4-foot wire trays holding one layer of oranges; more scantlings and other layers of trays were placed, until they were 11 high, making a stack of 180 cubic feet. Over this was spread an oiled canvas, and at each end under the canvas was placed an earthenware vessel, into each of which was put two ounces of 60 per cent fused cyanide of potassium, four fluid ounces of water, and lastly two fluid ounces of sulphuric acid. This was double the amount generally used for the treatment of scale-infested trees in the orchard. The fruit was subjected to the gas for forty-five minutes. Four men did the work and operated upon three stacks of fruit without loss of time. When the oranges were spread on the trays all infested oranges were rejected; in this way 110 boxes were destroyed.

On September 28th the steamship "Colima" arrived from Central American ports. One of the passengers had a box of yellow guavas that were infested with lepidopterous larvæ. They work in the same way that the codlin moth attacks the apple and pear. The worm is nearly as large as the codlin moth larva, but darker, and some of the guavas contained two specimens. There is a possibility that this pest would also attack the strawberry guava that has been extensively planted in the southern counties, so the fruit was destroyed.

On October 24th the steamship "Gaelic" arrived from Japan and had

on board one hundred and fifty two-year-old plum trees that were very badly infested with a brown *Chionaspis* that extended down the stem below the surface roots. Specimens of those trees were treated and preserved; the balance were burned.

On the same steamer were one hundred one-year-old pear trees, infested with a borer. This is undoubtedly the larva of a beetle. It is a small, white, cylindrical worm, and measures one third of an inch in length. In its operations it eats an irregular patch of the bark, from one half to one inch long and one quarter of an inch wide; sometimes this is vertical, and in others it has extended around the tree; it then enters the wood and tunnels upwards for an inch and a half, killing the twig above the point of entry. The trees were burned, but specimens of the borer and their work were saved.

BENEFICIAL INSECTS.

As per instructions, I visited in August last Santa Barbara, Los Angeles, and Orange Counties to examine into the condition of the last importations of Australian ladybirds. The first place visited was the olive orchards of Hon. Ellwood Cooper, at Ellwood. The first orchard examined was a disappointment, but it afterwards proved to be an object-lesson of value. Here the black scale was very plentiful and the ladybirds scarce. Mr. Cooper's explanation of this is undoubtedly correct. At the time the "black ladybirds" (*Rhizobius ventralis*) arrived (in the spring of 1892), Mr. Cooper's men were spraying this orchard with kerosene emulsion, and he directed the men to reserve forty-nine trees in the center of the orchard, where he placed a colony of *Rhizobius*. Those forty-nine trees are comparatively free from young scales and black fungus. The ladybirds were undoubtedly prevented from working on the sprayed trees by reason of the odor. They are now spreading through the orchard, and I look for good results.

The next orchard visited (the central one), where no spraying had been done, and in which no ladybirds had been placed, was indeed encouraging. This orchard is separated from another—where a colony was placed—by a gully filled with oak trees. Here the *Rhizobius* were very numerous, and their good work was evident.

The next orchard—the one where the original colony was liberated—is the evidence that makes Mr. Cooper so confident that the black scale can be conquered. In this orchard the old black scales were as plentiful on the twigs as they are in the other orchards visited, but the young that hatched during the summer have been destroyed by the *Rhizobius*, and the trees are free from honey-dew. I visited this orchard one month later, and found that the *Rhizobius* had migrated to trees that furnished more food. I still found some larvæ, but it was evidently a hard struggle with them for existence. Mr. Cooper had removed a colony to another orchard, where food is abundant, about four weeks before my last visit to his place, and upon examining the tree where he placed them I found larvæ two-thirds grown.

At Mr. Cooper's I found beetles and larvæ of the steel-blue ladybird (*Orcus chalybeus*), but not in such numbers as would give any hope that they will do any good against the black scale. When Mr. Koebele sent this species he stated that it was for the "red scale" (*Aspidiotus aurantii*), so we are not disappointed.

The large blue, six-spotted ladybird (*Orcus australasia*) is a more general feeder, and I think in time will be an effective help in keeping down the different scale pests. It appears to love the sunshine, and was more plentiful on the outer row of the orchard and on the top branches of other trees.

Rhizobius debilis is also increasing. This is a smaller beetle than *R. ventralis*, and feeds on the "pernicious" scale as well as the "black."

I next visited Mr. L. N. Kercheval's orchard in Los Angeles, where the steel-blue ladybird was placed. The State Board had received very encouraging reports in regard to this colony. A well-known fruit grower made the discovery last July that this ladybird was steadily increasing in spite of the condemnatory reports that had been circulated about it in the spring, and reported the facts to the papers. A number of the fruit growers then visited the orchard, and afterwards petitioned the County Supervisors to appoint a guardian. The appointments made were not satisfactory, and the State Board was requested to take charge of them. I was then instructed by the Secretary to see what could be done. I secured the following authority from the owner:

RIALTO, August 28, 1893.

Mr. Alexander Crow is hereby authorized by me to take charge of the *Orcus chalybeus* on my place in Los Angeles, in the interest of the State Board of Horticulture.

LELAND N. KERCHEVAL.

I was instructed to employ Mr. John Aerni, the lessee of the orchard, to guard them at a monthly salary of \$40. I was also instructed to distribute the ladybirds, if in my judgment it was deemed advisable. After looking carefully over the orchard, and noting the fact that, as far as I could see, food in the upper or northern portion of the orchard was plentiful, I so reported to Mr. Cooper, and under his advice, only three colonies of one hundred each were distributed. One colony was sent to San Gabriel Valley, one to Orange County, and the other to Santa Barbara County. While the increase of this species was very good, we deemed it best to let them remain this winter. They have certainly increased more rapidly than any species of our native *Coccinellidæ*, and I still consider it a valuable insect.

I next visited Orange, but could find no trace of the colony sent there, nor at Tustin. One of the places where we found beetles and eggs in the fall of 1892 had been sprayed, as nothing could be seen of them in April, 1893—about that time the Los Angeles colony was reported a failure.

My instructions were to return to Ellwood on September 23d, to assist in the distribution of the black ladybird (*Rhizobius ventralis*), but I was detained in San Francisco until the 30th, on account of quarantine duties. Mr. Cooper thought that all the applications would be in by that time (September 23d), and we could fill them all on my visit. In this he was agreeably mistaken, for after sending out 453 colonies—of twenty-five to fifty ladybirds in each—we have since received applications for nearly 500 more colonies. These will be sent out in May or June. This I consider preferable to sending them during the rainy season, although the larvæ could be found last January. Each colony was sent in a small, flat wooden box, with sliding cover, and strong enough to resist the pressure in the mail sacks. In each box was placed a little damp sphagnum moss that supplied the necessary humidity in such a small, close space. The moss also prevented injury to the beetles

in the handling of the mail sacks. The majority of the applications came from the southern and central coast counties. The value of this ladybird can hardly be estimated, and establishes the wisdom of the State Board's policy and efforts in behalf of the fruit growers. It also adds additional luster to Professor Koebele's name.

INJURIOUS INSECTS.

When in the southern counties, I visited, as far as possible, the different Horticultural Commissioners and discussed with them matters relating to their work. In Santa Barbara County the Supervisors are pursuing a very unwise course in regard to their horticultural officers. The latter are certainly to be thanked for the amount of interest and work performed by them for the benefit of the fruit growers and the county at the small compensation allowed them.

Ventura County has an active Board and local inspectors. Here the Supervisors are more liberal and the result is a county free from the more destructive fruit pests. Occasionally a patch of "red" and other serious scales have been found, but by vigorous work they have been stamped out and the county fruit interests protected.

It was reported to the Los Angeles County Supervisors in August, that certain orange groves in the Downey and Rivera districts were seriously infested with "purple scale" (*Mytilaspis citricola*). Commissioner John Scott was instructed to look into the matter and have the scale exterminated. He invited me to accompany him, which I did, spending two days in that section. This investigation revealed the fact that this most destructive citrus tree pest is very widely distributed over that valley. The trees on which the pest was introduced were Florida-grown and planted four years ago. The scale has spread into some large seedling trees. I advised that a thorough tree to tree examination be made, and all infested trees be cut back to the large branches or stump and well scrubbed with soap or rosin solution, and the adjoining trees be fumigated with hydrocyanic acid gas.

In the bay district at San Diego, I found considerable of this purple scale on Florida-grown trees, that had been allowed to spread. A new Commission was appointed last May, and they have taken hold of the insect question in a vigorous manner and are determined to stamp this and other pests out. The fruit growers, Supervisors, and the press of the county are assisting and encouraging them in their good work.

Such a pest as the "purple scale" would be a serious menace to San Diego's bay district becoming the leading lemon section of the State. Its natural advantages and the already extensive plantations of this fruit justify the most stringent measures to stamp out this pest.

The Commissioners of Orange County have to do their own inspecting and quarantine work, and appear to have the confidence of their citizens. This county was unfortunate in having the red scale in a number of its groves before any effective means of fighting it were known. With spraying and fumigating, the orchards are much improved within the past year. The cottony cushion scale got a start last year, but the Commissioners placed a colony of *Vedalia cardinalis* in the infected orchard, that thoroughly cleaned the scale out.

San Bernardino County Commissioners are also well supported by their Supervisors. No new pests are reported by them, although the

black scale has spread throughout that locality—a section that heretofore has been considered unsuitable for the increase of this scale. The increased shade and new acreage of trees planted, with its accompanying humidity, probably account for this.

Riverside County is peculiarly fortunate in having probably 90 per cent of its citizens directly interested in her orchards and vineyards. On this account the Horticultural Board is well supported. The Commissioners show good judgment in the selection of their local inspectors; they are young, active men, and their work speaks volumes of praise. In this county anything in the shape of a scale insect is vigorously fought. However, I think that they could save the heavy expense of fumigation in any orchard where the cottony cushion scale is found, as this scale can now be successfully suppressed by the *Vedalia*.

In Alameda County I found some larvæ infesting ripe cherries that, when bred, proved to be the codlin moth (*Carpocapsa pomonella*). This, I think, is a new food for this pest, but they were not found in any great numbers.

PARASITES.

In the spring of 1891, a bulletin was issued by your directions, calling attention to a parasite (*Coccophagus citrinus*) found attacking the "yellow scale" infesting citrus trees in the San Gabriel Valley. This bulletin met with considerable adverse criticism from certain parties, who pronounced its recommendations as premature, but I am pleased to report that on my recent inspection of the central portion of the valley, where the scale was the most abundant at that time, it was found to be now practically free from "yellow scale." In the Downey section, where this scale has got a strong foothold in several orchards, it is on the increase and the current year's growth and fruit are badly marked. Here I saw no trace of the parasite. An effort should be made to introduce them. Several orchards south of Los Angeles that were formerly infested with this scale have also been restored by this chalcid fly.

Early in October my attention was called to the fact that the "red scale" (*Aspidiotus aurantii*) was decreasing in the orange and lemon groves south of Los Angeles, but I was inclined to believe that it was only the natural result of such insects after reproducing their kind. But an examination of the infested branches, and leaves, and fruit, soon convinced me that something more than old age was the cause of the great mortality, for small and half-grown scales were numbered among the dead. Specimens were numerous where the disease was in the incipient stages. This was indicated by a chocolate blotch or discoloration of the insect; sometimes this would appear on the abdominal segments, and on others the body of the scale would have from one to four shrunken brown spots. When in an advanced stage of the disease, some of the specimens placed under the microscope showed unmistakable signs of a fungous growth. Whether this fungus is an after result of the disease or is the primary cause of the great death rate, cannot be determined unless by cultural experiments with the fungus in new groves. In some specimens the ventral scale is covered with this fungus, and in others the body of the scale; in the latter case the scale is forced up and the wind or shaking of the branches removes it, leaving a white spot, indicating where the scale has been.

The orchards visited were Mr. George Dalton's and Mr. McDonald's,

on Washington Street, and Mr. L. N. Kercheval's on Lemon Street. At the latter place the disease was more noticeable, and this would lead us to hope that it is one of the fungi sent over by Professor Koebele on his last mission to Australia. This will be watched, and, if necessary, steps will be taken to disseminate the disease or fungus to other sections that are troubled with red scale.

ATTELABIAN SNOUT BEETLE.

Rynchites bicolor, Fab.

A small, dark red beetle, with deep blue-black head, snout, and legs. It measures fully one fourth of an inch. The wing-covers are nearly square and finely punctured in rows. They are frequently found on ripe blackberries and raspberries, puncturing the fruit with their beaks, causing it to decay. In portions of Europe this beetle is very destructive to grapevines.

The different kinds of *Attelabus* roll up the edges of the leaves, forming little nests the size and shape of thimbles, to contain their eggs and shelter their young, which afterwards devour the leaves.

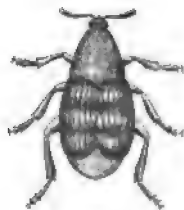
This beetle is also found on oak leaves in early summer.

Remedies.—This insect has not been reported in sufficient numbers to be considered a pest, so simply jarring the canes will cause them to drop to the ground, where they can be destroyed. If found on other than bearing berry canes they can be killed with Paris green—one pound to two hundred gallons of water. Keep the solution constantly stirred, and apply with a force pump and fine spray nozzle.

BEAN WEEVIL.

Bruchus obtectus, Say. *Bruchus fabæ*, Riley.

As this destructive little beetle has been reported from one of the principal bean-growing counties of the State, a short account of its life history, also a successful method of destroying it, will be of interest.



Bean Weevil,
very much enlarged.

The perfect beetle measures a little over one eighth of an inch in length; the head, thorax, and wing-covers are dark grayish-brown, the latter being faintly striped longitudinally. The extremity of the abdomen protrudes beyond the elytra, and is covered with short brown hairs. The snout and head are somewhat bent under the thorax, giving the insect a chubby appearance. The abdomen, legs, and tips of the antennæ are obscure, rufous. The female deposits her eggs on the pod, and soon after hatching, the larva burrows into the pod and enters the bean; from one to over a dozen have been found in a single seed, which they devour, leaving very little but the skin. The larva when full grown gnaws to the edge, where it changes to the pupa inside the bean, from which it makes its escape in the perfect state.

Beans that have been or are still infested can be readily detected by the hole where the beetle escaped or by the circular dark spot on the skin under which the larva or beetle is located. Such beans should not

be taken into a section that is free from the weevil, and too much care cannot be taken in purchasing clean seed.

Remedies.—Dipping the beans in hot water for one minute has been recommended as a sure cure for this pest, and after experimenting in this line I am satisfied as to its efficacy in killing the weevil, but it also killed the germ of the bean, for even those beans that were not attacked by the weevil failed to grow. I then made several experiments with bi-sulphide of carbon, and found it to be very effective in destroying all insect life, and from its powerful solvent properties it also killed the weevils in the pupa state inside the beans. When I found that this was effective, I tested the seed with double the amount of bi-sulphide, in order to see the effect upon the germ. This was equally satisfactory, for all the beans that had not been too much punctured germinated.

As an expeditious way of treating the beans I would suggest the use of large air-tight boxes with hoppers on the top and chutes at the bottom, through which the beans can be quickly withdrawn into sacks after having been disinfected. To each one hundred cubic feet I would use one pound of the bi-sulphide of carbon. Pour the liquid into a shallow earthenware vessel placed on the top of the beans. As the bi-sulphide is very volatile and its specific gravity is greater than the air, the gas or vapor settles to the bottom of the box, filling it and displacing the air. The box should remain closed for four hours. This work should be done in the open air or in an open shed. The workmen must stand to the windward and be careful not to inhale the fumes. Bi-sulphide of carbon is highly explosive, so no lights or smoking should be allowed in the vicinity. The beans intended for seed or holding over should be treated in the fall. All straw and rubbish should be raked up and burned soon after thrashing, so as to destroy any pupæ, or material in which the beetles could hibernate.

BLACK THRIP.

Thrips.

A minute, narrow, black, six-legged insect, with four narrow, transparent wings bordered with light silvery hairs.

This is an old and well-known pest of hothouse plants. Occasionally it is found on laurestines, fuchsias, and other outdoor ornamental trees or shrubs in this State, but I can find no record of it as a pest on citrus trees. The past winter, however, I received specimens of oranges and orange leaves from San Diego County that were completely covered with light-colored young and fully developed black insects, together with the small, dark blotches that indicate the presence of this pest. The fruit had changed to a dull gray color that would ruin its commercial value. The leaves were also affected in a similar manner. This discoloration was caused by the bite of the thrips, for although they are classed with the order Hemiptera, they are provided with bristle-like mandibles, with which they tear the epidermis of the leaf or fruit. A careful examination of orange blossoms and other sweet-smelling flowers will reveal the presence of delicate, but very active, yellowish insects. These are *Thrips tritici*, and will give an idea of the appearance of the other, except in color. But the black thrips are slightly larger and more sluggish in their movements.

Remedies.—Trees or plants infested with thrips can be disinfected by spraying or dipping in a warm solution of whale-oil soap—one fourth to one half a pound of soap to each gallon of water, according to the hardness of the plant. Several importations of *Araucaria excelsa*, from Australia, have been found infested with black thrips, and were successfully disinfected by fumigation with hydrocyanic acid gas; but the density of the gas should be slightly less for araucarias than is recommended for citrus trees, or it is liable to injure the foliage.

For the San Diego orange trees I recommended that they be fumigated with hydrocyanic acid gas, in the proportion of one ounce of cyanide of potassium (60 per cent), one fluid ounce of sulphuric acid, and two fluid ounces of water to each one hundred cubic feet of space inclosed by tent, and prepared as directed for red scale. This was done by the County Horticultural Commissioner and was entirely successful.

PEACH TWIG BORER, OR STRAWBERRY CROWN BORER.

Anarsia lineatella, Zeller.

This is a very small, dark gray moth, with darker spots and streaks on the forewings. The larva, or caterpillar, when full grown, is nearly half an inch long, and varies in color from dark brown to brownish pink in the different stages.

This pest is found in nearly all the peach districts of the State, and in some seasons the borers are so numerous that they destroy all the young growth in the center of the tree. There has been considerable mystery about the life history of this moth, but Mr. E. M. Ehrhorn, of Mountain View, Santa Clara County, has cleared up a portion thereof that will assist in our successfully fighting them. It is Mr. Ehrhorn's opinion that the female moth deposits her eggs in the crotch of the branches or between the rough bark in the fall of the year. In support of this theory he called my attention the past winter to the very small borers at work in the spongy bark; here they grow slowly until the tree produces new growth, when they leave the bark and burrow into the tips of the new shoots, which soon wilt and dry up. Frequently the larvæ are nearly full grown when they attack the young growth. This accounts for the fact that upon old trees the under and inside twigs suffer the most from their attacks, whereas the top and outside branches escape.

Besides the peach it also attacks the almond, nectarine, apricot, and prune.

Remedies.—The trees should be sprayed in January or February with coal oil emulsion or rosin solution, or the lime, sulphur, and salt mixture. These washes will penetrate the burrows and destroy a large percentage of the small larvæ. When the trees have started to grow all the wilted shoots—indicating the presence of borers—should be clipped off and burned. The later brood attack the fruit near the stem. When the larvæ are full grown they change to small brown chrysalis, generally among the dry leaves formed by the death of the tender twig, or under the rough bark.

In the Eastern States this pest is subject to the attacks of parasites. An effort will be made to introduce them the coming summer.

CUT WORM.

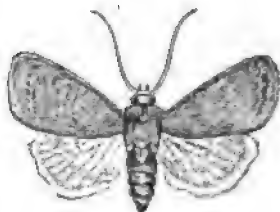
Agrotis atomaris, Smith.

This pest has been a source of annoyance and serious loss this season in several fruit-growing sections of the great San Joaquin Valley, especially on grapevines and prune trees. They burrow into the loose soil from two to three inches under the surface, where they remain during the day, and at night they ascend the vines and trees,



Larva, natural size.

where they feed upon the tender leaves, and if not checked will seriously injure or kill the trees. They make their appearance in April, and by the middle of May they have completed their growth and measure about one inch and a half in length, of a light gray color, smooth and naked. At this stage they burrow deeper and form an oval hollow, where they change into a brown chrysalis preparatory to coming out as a moth.



Moth, natural size.

Remedies.—The only satisfactory way to combat this pest is to place a band of stout paper around the stem of the vine or tree and smear it with printer's ink, in which a little castor oil has been mixed to prevent it drying too quickly. See that the band is kept moist by repeated applications of the ink; about two or three times a week will be sufficient to prevent them climbing. Commissioner Berry, of Tulare County, recommends placing a piece of smooth cardboard around the stem; cut in such a way that it stands at right angle from the tree and with the glazed side downward, it makes a perfect barrier to the worms. George T. Hughes, of Modesto, saved his trees by having his men commence in the morning as soon as they could see, and by jarring the trees slightly brought the worms to the ground, where they were destroyed.

SPHINX MOTH.

Philampelus achemon, Drury.

Several vineyards in Fresno County were seriously injured by the caterpillar of this moth during May and the first week of June. The moth is large and handsome, with narrow sinewy wings, indicating great power of flight. When expanded they measure nearly four inches from tip to tip. The fore wings are a grayish-brown, with three dark blotches upon each. The hind wings are a beautiful rose color with a light brown border, through which run a line of small dark blotches. The moth is very active on the wing and can be seen after sundown darting about depositing her eggs on the grape leaves. The eggs are round, pale green, and attached to the leaf by a gummy substance.

In the first stages the larvæ are light green, with a long, dark brown anal hair or horn; they change to a reddish brown as they grow older. The horn finally disappears, leaving a small cream colored tubercle with a black central spot. The full-grown larva is speckled over the back

and sides; the back is brown, with a light band along each side. Under this the body is dark brown with six to eight creamy white, oblique bars. I raised larvæ from the egg to the chrysalis this season, in confinement, in twenty-nine days. When about to change to the chrysalis they descend from the vine and burrow into the soil a few inches, where they remain until the following spring, when they come forth as winged moths.

Remedies.—The most effective way to check this pest is to hand pick, or clip the worms in two with a pair of scissors. As this can be done in the daytime, very thorough work can be accomplished. In the winter the ground should be gone over several times with a disk harrow after plowing, so as to destroy the chrysalis.

Fourteen years ago this worm did considerable damage to the young raisin vineyards in a portion of what is now Orange County. They have also appeared in other parts of the State in different seasons and have been cleaned out by hand picking.

VIII.

SCALE INSECTS.

AN ELM SCALE.

Gossyparia ulmi, Geoffroy.



Natural size.



Female, enlarged.

The young elm trees in the grounds of the Leland Stanford, Jr., University, at Palo Alto, were noticed by Quarantine Guardian Ed. M.

Ehrhorn the past season to be seriously infested with this injurious scale. The scales in the adult stages locate on the under side of the twigs and branches, and the bark is thickly covered with an unsightly black fungus that soon destroys the vigor and beauty of this popular shade tree. The trees have been planted several years, and are now fifteen to twenty feet high. I have been unable to trace the introduction of this scale, but as this is the only place that I know of in the State where it has secured a foothold, it was undoubtedly brought here upon the trees from an Eastern nursery. It is a common pest of the elm in portions of Europe, and has within the past six or seven years been noted in several of the Atlantic States.

Mr. Howard gives the following description of this scale in the August (1889) number of *Insect Life*, taken from M. Signoret's article in the *Annales de la Societe Entomologique de France*, for 1875, with a fuller description of the adult male:

The newly hatched larva is of an elongated oval form, narrower behind, of a clear yellow color, each segment with a strong lateral spine, and the front border of the body with six spines. The genito-anal ring has six hairs, around which is later formed a secretion, which renders them invisible. There is a double row of spines down the middle of the back; the antennæ are six-jointed, the first three joints longest, the fourth and fifth shortest.

The adult female before impregnation is of a similar shape, but the terminal lobes of the abdomen are more developed. Each segment is covered with spiny spinnerets secreting wax. The antennæ are six-jointed, second and third longest, fourth and fifth shortest. There is an elongated protuberance each side of the antennæ. The legs are short and slender, with the tibia shorter than the tarsus. The genito-anal ring has eight hairs.

The full-grown male larva has seven-jointed antennæ, joint 7 longest, the rest equal. After impregnation the female becomes more round, fixes herself, the secretion becomes much more abundant on the sides, making at first lammellæ, which afterwards unite into a continuous cushion. The back becomes smooth and the segmentation is plainly visible. The dorsum is plane transversely, but curved longitudinally. Particularly after the birth of the young, the female becomes well separated from the waxy cushion, and is easily removed from it (even jarring will accomplish the removal), leaving the noticeable empty white cup with its fringed edges.

In describing the male, Mr. Howard says that an active form with wing pads issued some days before fully fledged males were noticed.

The antennæ of the male are ten-jointed, the joints well separated; the wings are represented by pads of varying length. The poisers appear rather thick and fleshy, but lack the terminal hook. The abdomen is very stout, sub-oval, considerably broader than the thorax, and when seen from above covers coxæ, trochanters, and base of the femora. Its segments are not well marked. A few days after this form makes its appearance the cocoons begin to give out the perfect males, which issue with wings fully expanded. There seems to have been a molt between this pseudimago and the perfect males, for in no other way can we account for the difference in form. The antennæ possess the same number of joints (ten), of about the same relative proportion, although joints 3 and 4 are longer, but the incisures are rather better marked. The poisers are lighter in color and less fleshy in appearance, and the curved hook is plainly visible at tip. The abdomen is rather longer, much more slender, and tapers gradually from base to tip. Its segments are well incised and plainly separable from above. It does not cover the hind coxæ and trochanters. The tibiae are longer in proportion to their tarsi. The anal segment gives off two waxy filaments as long as the entire body. These filaments were not noticeable in the pseudimago.

The cocoon of the male is rather close, though thin, flattened oval, and pure white, about 2 mm. long by 1 mm. wide, and is composed of rather coarse wax fibers.

There appears to be but one generation of the scale each year and the young are brought forth alive in May and locate on the leaves, where they grow rapidly, afterwards locating on the branches.

An effort will be made this fall and winter to stamp out this destructive pest.

Remedies.—Rosin solution for winter use. The following are the proportions of materials for winter wash:

Rosin.....	30 pounds.
Caustic soda (70 per cent).....	9 pounds.
Fish oil.....	4½ pints.
Water.....	100 gallons.

Place the rosin, caustic soda, and fish oil in a large boiler, pouring over them about twenty gallons of water, and cook thoroughly over a brisk fire for at least three hours; then add *hot* water, a little occasionally, and stir well, until you have not less than fifty gallons of hot solution. Place this in the spray tank and add cold water to make the necessary amount. Never add *cold* water when cooking.

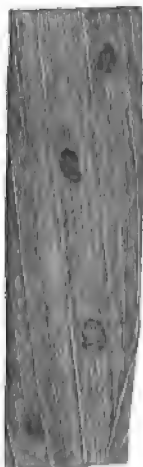
Summer remedy, to be used as soon as the scales have hatched. Directions for making emulsion:

Kerosene oil (150° test).....	5 gallons.
Common laundry soap (or 1½ bars, usually sold as pound packages).....	1½ pounds.
Water.....	2½ gallons.

Dissolve the soap by boiling in two and one half gallons of water. Then remove from the fire and add the oil to the hot soap water and churn violently for fifteen minutes, or until it has the appearance of butter. After above is emulsified, use by diluting one gallon of the mixture to six and one half gallons of water, and add two and one half pounds of home-made soap, dissolved in a little boiling water, to the solution (all the mixing is done with hot water), and apply at a temperature of 140° Fahrenheit.

THE DEPRESSED SCALE.

Lecanium depressum, Tar-Toz.



A dark, flattened, oblong scale, frequently found upon palms and other plants imported from the Sandwich Islands. It resembles a full-grown "soft orange scale" (*L. hesperidum*), but is darker. From the amount of black smut and the dirty appearance of the infested plants, I consider this would be as troublesome a pest as the other *Lecaniums* that have gained a foothold in the State. Maskell reports this species as occurring in New Zealand and Europe. The following is his description of the female; the male is unknown:

Adult Female.—Elongated, somewhat acuminate at the cephalic end; slightly convex; reddish brown; skin marked with two dorsal keels and numerous irregular tessellations, finely punctate. Antennæ of eight joints; on the first two and the last three joints, some hairs. Feet normal, rather long; one of the lower digitules is larger than the other. Length of insect about one tenth of an inch.

PINE TREE SCALE.

Lecanium insignicolla.

This is a large black, almost spherical scale, found on the Monterey pines (*Pinus insignis*) in a portion of Golden Gate Park, San Francisco; also upon the same pines planted on the hills back of Oakland.



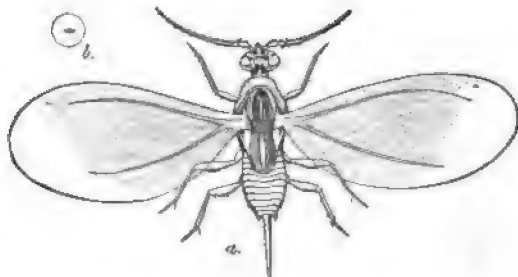
The infested trees presented a sickly, stunted appearance, with scant foliage, and covered with honey-dew and black fungus. The scales cluster thickly around the small shoots. They are oviparous, with but one generation a year. The young are elongated, dark brown in color, with a short fringe along the edges, and a deep abdominal cleft. As soon as they hatch they attack the tender pine leaves, and afterwards remove to the shoots, where they locate permanently. Commissioner Pryal, of North Temescal, found a cherry tree infested with this scale. It was growing near an infested pine, and the scale presented the same spherical form and gregarious habits as those upon the pine. Last season the pines in the infected district of the park had a much healthier appearance, and on examining the scales I found a large percentage with a small circular hole through the back, indicating the work of an internal parasite. It is to be hoped that the parasite will increase sufficiently to keep the scale down. In October last a strong colony of the "black ladybird" (*Rhizobius ventralis*) was placed among them, and they will undoubtedly do good work.

MALE OF THE BLACK SCALE.

Lecanium oleæ, Bernard.



Male pupa, enlarged.



a Winged male, enlarged. b Natural size.

The black scale is an old and widely distributed pest. It was known at Nice, and did considerable damage to the olive trees in that neighborhood as far back as 1743. In other sections of Europe it is very troublesome. It is also known in New Zealand, Australia, and the Sandwich Islands. I have also found plants from Japan infested with this scale, showing the existence of it in that country. Here in California it has been known for thirty years. Citrus, olive, and apricot culture in the coast counties has been seriously injured by its attacks. The humidity is more conducive to their increase and the growth of the black fungus than the warm interior sections. The great quantity of honey-dew discharged by them and falling on the upper surface of the foliage and fruit, forms a suitable propagating bed for the spores of the fungus to adhere to and grow in. With such a wide distribution, and the fact that it has been known so long, it is remarkable that the male insect—although diligently searched for—has been unknown and was generally supposed not to exist. The honor of its discovery belongs to Mr. B. W.

Griffith, a careful and enthusiastic microscopist of Los Angeles, California. While examining some black scale on oleander bushes during the latter part of January, he found some male pupæ, from which he bred the perfect winged male. His observations were continued and he found the males developed through February, March, and the early part of April. In a recent letter from Mr. Griffith, he informs us that the males began to issue from the pupæ the last week of November. This would indicate a period of five months that the males can be found in the winged state. Mr. Griffith kindly furnished the microscopic slides from which the accompanying drawings were made. The following is his description of the pupa and adult male:

Description. Pupa.—Dark gray, varying in length from 1 to 1.5 millimeters; width, from .5 to .8 millimeters. Dorsum with a distinct longitudinal carina and two delicate transverse carina.

Winged Male.—Orange color with lighter colored wings. Length of body, exclusive of style, 1.2 millimeters; style, .4 millimeters; anal plates, .5 millimeters. Antennæ ten-jointed, the first three joints are short, the second is swollen and pyriform, the fourth is longest and equal to the three first; the balance of the joints gradually diminish in size; entire length of antennæ, .55 millimeters; wings, 1.1 millimeter; legs slender and about .8 millimeters in length. Eyes six in number—two anterior compound, two ocelli at sides of head, and two compound eyes at posterior part of head.

Like the males of other scale insects, their existence is short after they reach the winged state.

THE ORANGE CHIONASPIS.

Chionaspis citri, Comstock.



The cut represents the stem of an orange tree infested with this scale, received from Australia. Citrus trees, also holly-like shrubs (*Osmanthus ilicifolius*), received from Japan, were also found infested with this injurious insect, so the trees and shrubs were destroyed. Prof. H. A. Morgan, of Baton Rouge, La., in his treatise on "Scale Insects of the Orange in Louisiana," has the following in regard to this pest:

When trees become badly infested they present an appearance, due to color of the male scale, resembling white dusted meal, upon the trunk and branches. This scale does extend its work of destruction into the tender branches, and in such cases acts with the rapidity of the dreaded *Mytilaspis Gloverii*.

This insect is very prevalent in this State, being found from New Orleans to the Gulf. By extracting the juices from the tree it causes bursting and very ugly wounds in the bark, and many of the half rotten trunks of the older trees might be traced to the bursting of the bark caused by this insect.

From the above it will be seen that this is not a desirable insect, and orange and lemon growers should keep a sharp lookout for it. If found I would advise the destruction of the infested trees in order to stamp it out.

The following is Professor Comstock's description of this pest. He reports having received it from Havana:

Scale of Female.—The scale of the female is of a dirty blackish-brown color, with a gray margin; the exuvie are brownish yellow. There is a central ridge, from which the sides of the scale slope like the roof of a house. The greater prominence of this ridge and the more elongated form of the scale are the principal differences between this scale

and that of the female of *C. euonymi*. There are no groups of spinnerets; the mesal lobes are larger and more distinctly serrate than in *C. euonymi*; and in the last-named species the plates are in twos, while in *C. citri* they occur singly.

The male scale is narrow, of a clear white, and more readily detected than the female. There is a ridge from the molt to the posterior extremity. The edges of the scale recurve. The exuvia is light yellow to brown.

THE LONG SCALE.

Mytilaspis Gloverii, Packard.

The cut represents a specimen branch taken from a shipment of orange trees received last spring from Japan. The trees were only two years old from the graft (citrus trees are grafted instead of budded in Japan), and even in that time portions of the bark were completely covered with this narrow but destructive scale. The trees were burned. Eleven hundred and fifty-seven boxes of oranges arrived at the port of San Francisco from San José del Cabo, Mexico, on September 15th, infested with this pest. All the infected oranges were destroyed and the others fumigated with hydrocyanic acid gas. This scale is also found in Europe, Florida, and Louisiana. I am not aware that it has yet obtained a foothold in California.

The female of this species resembles the "purple scale," but differs in being straighter and narrower, and in color it is yellow to dark brown. The ventral scale is white, very thin, and split longitudinally, showing the eggs arranged in two layers. In this characteristic it differs from the purple, and can be readily distinguished from the latter. The body of the female is light purple in color, with the last segment yellowish. The eggs are white when first laid, but become tinged with purple before hatching. The male scale is similar in form to that of the female, but smaller and very seldom curved.



PURPLE SCALE.

Mytilaspis citricola, Packard.

Four years ago two carloads of orange trees were received in this State from Florida, and planted in Los Angeles and San Diego Counties without disinfection. The result is that the climate that has been preached up by importers of Florida stock as unfavorable to the development of this species of scale has proved to be the opposite, for on my visit to the above counties last summer I was shown trees that were completely covered from the ground to the young leaves and fruit. An active fight of extermination has been started against this scale by the Quarantine Guardians and the fruit growers in the infected districts, and I hope it will be vigorously pushed until every purple scale is exterminated.

All Florida-grown trees in the State should be carefully examined, and all trees found infested should be cut back and the stems scrubbed with whale-oil soap or rosin solution, $\frac{1}{2}$ of a pound of the former to each gallon of water; the rosin, as directed for citrus trees. The other citrus

trees in the immediate vicinity of infested trees should be fumigated with hydrocyanic acid gas, even if no trace of scale can be found upon them. The scale of the female is long, slightly curved and widened posteriorly. It is brown, with a purple tinge; the exuviae brown, with a delicate margin; ventral scale is well developed and of a dirty white color; it is a single piece attached to the lower edge of the scale, and is more or less incomplete posteriorly. Length of scale, .12 of an inch. The color of the female is pale yellow. The eggs are white and placed irregularly under the scale. The scale of the male is usually straight, of the same color as that of the female; in some specimens they are dark brown, almost black, and measure .06 of an inch.

IX.

BENEFICIAL INSECTS.

The importance of predaceous and parasitic insects has been more fully demonstrated in California than in any other country of which we have any record. The people of no other State or nation have labored more to make a success of their introduction, propagation, and distribution, and our experience justifies the hope that we will ultimately find a natural check for each and all of the devastating pests that attack garden, field, and orchard growths and products. This cannot be accomplished on one mission in quest of beneficial insects, or in one season's work in breeding and distributing such insects. But this Board proposes to continue its efforts in this direction, as well as to guard the horticultural interests by preventing the introduction and spread of new pests. We frequently receive specimens of ladybirds and other beneficial insects for determination, and in some instances with details of efforts made to destroy them under the belief that they were injurious. The two colored plates appended to the Board report, showing their natural size and color, will aid the fruit growers in distinguishing between them and the more common of our insect friends. Colored Plate I shows the recent importations from Australia, by Prof. Albert Koebele, of Alameda, under the directions of the State Board of Horticulture. Professor Koebele's discovery of the *Vedalia cardinalis* and its successful introduction and work in destroying the "cottony cushion scale" (*Icerya purchasi*) in this State, have given him a world-wide reputation. A brief mention of a few of the beneficial insects that have played a very important part in protecting the great fruit industry of California will be of interest under this head.

The first pest that the orchardist was confronted with was the "soft orange scale" (*Lecanium hesperidum*), introduced over thirty years ago. Orchards were not very numerous or extensive in those days, but around Los Angeles several old orange trees and a few promising young groves were to be found. The trees were deep green and vigorous, and the fruit bright and clean. In some way this scale was introduced and spread with alarming rapidity from tree to tree and from orchard to orchard. Some of the old trees succumbed to their attacks, and the dead stumps were dug out. The orchardists had no spraying outfits or fumigators, so they resorted to scrubbing brushes and soap suds, with which the

trunks and large limbs were disinfected. After a few years the scales began to diminish in numbers and the trees recovered, and it was supposed that the pest had run its course and would finally disappear. A closer inspection of the scales showed the presence of internal parasites, and to their presence we are indebted for keeping this scale under subjection at the present time. One of the parasites is *Encyrtus flavus*, and the other is *Coccophagus lecani*. Both are chalcid flies, and hardly discernible with the naked eye.

The "cottony grape scale" (*Pulvinaria innumerabilis*) was found in different parts of the State fifteen years ago, infecting grapevines, especially those trained on arbors. The *Encyrtus flavus* developed a taste for it, and has stamped the scale out. The "common mealy bug" (*Dactylopius adonidum*) did considerable damage to the orange in Los Angeles in 1882 to 1886. This pest would congregate and breed in the clusters of fruit, especially around the stem and where two oranges touched each other. The fruit was so covered with honey-dew and fungus that the oranges dropped. In 1886, I discovered a beautiful new chalcid fly at work amongst the *Dactylopius*; it was afterwards named *Rileyia splendens*. This parasite was very effective. In 1872, the "yellow scale" (*Aspidiotus citrinus*) was introduced into the San Gabriel Valley on orange trees from Japan, and by 1886 had spread to nearly all the groves in that beautiful section. The foliage was yellow and the fruit covered with scale. In 1888, an internal parasite was found preying on the scale, and has spread to all the groves. The district where the pest was the most serious is now practically free from "yellow scale." The parasite *Coccophagus citrinus* is a native of Japan. I have bred it from a few scales found on imported trees. It is the smallest parasite found on the scale insects that infest fruit trees in this State.

Another insect that for years damaged the deciduous fruit trees of the State is the "pernicious scale" (so-called San José scale), *Aspidiotus perniciosus*. The destruction caused by this pest is well known. Within the past four years this scale has been slowly but surely disappearing. The orchards in the neighborhood of San José are practically free from it, and other districts of the State show the same results from the work of beneficial insects. In this instance we have three species that are active in the good work. One is an internal parasite *Aphelinus fuscipennis*, and the others are ladybirds, the "brown-necked" (*Rhizobius Toorwoombæ*), and the "twice-stabbed" (*Chilocorus bivulnerus*).

The "brown apricot scale" (*Lecanium armeniacum*), found in some districts to seriously injure apricot and prune trees, received a check eighteen months ago in the Berryessa district of Santa Clara County. Over 90 per cent of the scales had holes in their backs, through which the parasites *Comys bicolor* had made their escape.

The most convincing proof of the value of parasites has been the introduction of the *Vedalia cardinalis*, already referred to. Figs. 8, 9, 10, 11, 16, and 17, colored Plate II, represent this ladybird in different stages, natural size and enlarged.

From the foregoing list and account of benefits derived from parasites, fruit growers can see the importance of further appropriation by the Legislature for the introduction of beneficial insects.

TWO-SPOTTED LADYBIRD.

Adalia bipunctata, Linn.

[Fig. 28, Plate II.]

This ladybird is very distinct, having red wing-covers with a black spot on each, hence its specific name. The thorax is yellow, with black marking in front in the form of a W. When in the Eastern States four years ago, Mr. B. M. Lelong collected three large colonies of this species and forwarded them to this State. They feed principally on aphids.

Anatis subvittata, Mulsant.

[Fig. 20, Plate II.]

This is one of our largest ladybirds, found principally in the northern counties of the State. It is brownish yellow, with black markings; head black; thorax black, with broad light-colored margins. At the base of the suture are two light-colored spots; the black markings on each elytra resemble the figure 5. This species feeds upon aphids, but are not very numerous.

TWICE-STABBED LADYBIRD.

Chilocorus bivulnerus, Mulsant.

[Figs. 2 and 3, Plate II.]

This is one of our most important native ladybirds. The larvæ are the most voracious, and destroy great numbers of young "black," "pernicious," and other scales. The young, as shown in Fig. 3, is long and covered with dark spines. It is crossed with a yellowish band near the middle. When about to change into the pupa or chrysalis, it selects the underside of the large branches, where it attaches itself with a gummy substance to the bark, head downward. In a few days the larval skin splits longitudinally, exposing the inclosed chrysalis. When the beetle issues from the chrysalis it has a black head, with white wing-covers; in a short time this changes to a shining black, with a red spot on each elytra. In this stage it also preys on scale insects. This beetle has been widely distributed within the past three years.

ASHY-GRAY LADYBIRD.

Coccinella abdominalis, Say.

[Fig. 27, Plate II.]

This beetle, together with *Hippodamia convergens*, did good in subduing the walnut aphids this season in the southern counties, and as a result the trees were free from smut. The ladybird is hemispherical in form, of an ashy-gray color, with seven small black spots on the thorax and eight on each wing-cover.

CALIFORNIAN LADYBIRD.

Coccinella Californica, Mann.

[Fig. 21, Plate II.]

This species is very common throughout the State, and resembles the ambiguous ladybird. The elytræ are orange-red, without spots or markings; thorax is black, with a light spot on each side. They feed principally upon aphids. Like other species of ladybirds, the larvæ do the most good.

22-SPOTTED LEIS.

Coccinella (Leis) conformis, Boisd.

[Fig. 5, Plate I.]

This is a beautiful yellowish-brown ladybird, with black markings, introduced from Australia in 1892. They feed principally upon aphids infesting orange trees, and woolly aphids on apple. In Australia it is claimed to do good work in keeping those pests down. The larva of this species is not furnished with hairy spines like the *Orcus*, but is provided with small fleshy projections on the lateral margins.

EYED LADYBIRD.

Coccinella oculata, Say.

[Fig. 4, Plate II.]

This ladybird is frequently taken for the twice-stabbed species. In this species the spots are larger and reddish-yellow. The head and lower edges of the thorax are also the same color as the spots. They feed on scale insects, but are not very numerous.

BLOOD-RED LADYBIRD.

Coccinella sanguinea, Linn.

[Fig. 25, Plate II.]

This is a small blood-red beetle, varying to a dull red. They are not very common. They feed on young scale and aphids.

JULIAN'S BANDED LADYBIRD.

Coccinella trifasciata, var. *Juliana*, Mulsant.

[Fig. 24, Plate II.]

This is not a very common ladybird. Mr. Lelong reports having found them feeding upon black scale at Mission San José, Alameda County. In the summer of 1892 I observed numbers of them, together with *C. trifasciata*, in Del Norte and Humboldt Counties, feeding upon aphids infesting wild plants.

PILATE'S LADYBIRD.

Exochomus Pilatei, Mulsant.

[Fig. 1, Plate II.]

This beetle resembles the twice-stabbed ladybird, but is much larger. It also differs from the latter in having the under side of the extremity of the abdomen black instead of red. The larva resembles the twice-stabbed, but is larger and lighter colored. Both the larva and beetle feed upon young black scale, but they do not appear to increase very rapidly.

CONVERGENT LADYBIRD.

Hippodamia convergens, Guerin.

[Fig. 22, Plate II.]

The illustration gives a good idea of the markings of this valuable beetle, although various shades of red to pale yellow can be found, and occasionally, when food is scarce, the beetles will be smaller and one spot less near the base of the wing-covers. Reports have been received this season from Santa Barbara and other coast counties, also from Sacramento, of the good work of this species in destroying the woolly aphis on apple trees.

AMBIGUOUS LADYBIRD.

Hippodamia ambigua, Le Conte.

[Fig. 23, Plate II.]

Like the preceding species, this one is common throughout the State, feeding upon aphis, which they soon destroy. During the fall and winter, when food is scarce, they frequently can be found in great clusters hibernating.

Hyperaspis lateralis, Muls.

[Fig. 5, Plate II.]

A small black ladybird, resembling *Exochomus marginipennis*, with two reddish-yellow spots on the elytra near the apex, two spots on the disc, and two blotches of the same color on the forward lateral margins. Forehead and edge of thorax yellow. Feeds on pernicious scale in the adult form.

Cypress trees (*Cupressus macrocarpa*) in the suburbs of San Francisco, that were seriously infested with the "cypress mealy bug" (*Dactylopius Ryanii*), were cleared of the pest by this ladybird. The larvæ of this species are covered with a cottony secretion, and resemble mealy bugs.

STRIPED LADYBIRD.

Megilla vittigera, Mannerheim.

[Fig. 28, Plate II.]

This ladybird is brown, with three dark stripes, and would be readily confounded with the striped squash-beetle (*Diabrotica trivittata*), but can be distinguished from it, as the latter has a yellow thorax and long antennæ. They are mostly found in swampy lands, and are supposed to feed on aphids.

KOEBELE'S LADYBIRD.

Novius Koebelei, Olliff.

[Figs. 3, 3a, 3b, 3c, 3d, and 4b, Plate I.]

Introduced in 1892 from Australia, bred in San Francisco, and distributed in Los Angeles, Alameda, Sacramento, Napa, Sonoma, Santa Clara, and Sutter Counties.

The illustrations give a good idea of this beautiful and active little ladybird. It feeds upon the cottony cushion scale (*Icerya purchasi*), searching out the solitary scales even better than the *Vedalia*. It passes through its different stages in about the same time as the latter. With those two ladybirds and the small dipterous fly, *Lestophonus iceryæ*, in the State, we have nothing to fear from the "cottony cushion scale."

SIX-SPOTTED ORCUS.

Orcus Australasia, Boisd.

[Figs. 2 and 2a, Plate I.]

This is another recent importation and is well established at Ellwood, Santa Barbara County. They are also breeding in Los Angeles and Alameda Counties. The female is nearly one fourth of an inch in length, deep blue in color, with six orange-red spots on the wing-covers. The male is similarly marked, but a smaller insect. This species is a more general feeder than *O. chalybeus*. In the former county it bred on "black scale," in Los Angeles on the "red," and in Alameda on the "pernicious" scale. It loves the sunshine, and is found more numerous toward the top and the outside branches. Mr. Cooper writes, under date of December 23d: "The *Orcus Australasia* are hiding away after the manner of the common red ladybird"—[clustered together]—"one place I saw as many as a double handful."

The larva and pupa resemble the same stages of Pilate's ladybird.

STEEL-BLUE LADYBIRD.

Orcus chalybeus, Boisd.

[Fig. 1, Plate I.]

A beautiful steel-blue, hemispherical ladybird, introduced from Australia by Mr. Koebele on his last mission to that country. This species appears to breed rather slowly as yet, but Mr. Koebele reports it to be

the most numerous of the ladybirds found feeding upon "red scale" (*Aspidiotus aurantii*) in Australia. We hope that when it becomes thoroughly acclimated it will sustain the high opinion entertained of it by its introducer. During the winter they hide away until May, and by July the first brood have changed to beetles; another brood issues in August and September.

The female (Fig. 1b) measures two twelfths of an inch in length, of a uniform steel-blue. The male, as shown in Fig. 1a, has a light yellow prothorax, and is slightly smaller than the female.

TWENTY-SPOTTED LADYBIRD.

Psyllobora 20-maculata, Le Conte.

[Fig. 6, Plate II.]

This is an active and widely distributed little ladybird. It is very numerous, but so shy that the slightest movement of the leaves on which it is searching for food will cause it to drop. They resemble the ashy-gray ladybird in color, but only measure about one tenth of an inch in length. They feed on the larvæ of scale insects and red spider.

BROWN-NECKED LADYBIRD.

Rhizobius Toowoombæ, Blackburn.

[Fig. 7, Plate II.]

This little beetle was formerly described under the name of *Scymnus marginicollis*, but is identical with *Rhizobius Toowoombæ*, an Australian species, and probably has been introduced from that country. Mr. Koebele sent this beetle about the time that he introduced the *Vedalia*, but it was found in the State previous to that. However, it has only been within the past four years that its value has been observed. It should be credited with a large portion of the work of ridding certain districts of the "pernicious scale." It breeds from early spring until late in the fall. As compared with the beetles the larvæ are very large; they are light colored and remain a long time in this stage, feeding voraciously. When about to change to the chrysalis they hide away under cobwebs, dry leaves, and other debris. The beetle is metallic black, with a brown thorax. They also feed on *Aspidiotus perniciosus*, *A. aurantii*, *A. citrinus*, *A. Nerii*, and occasionally on aphids.

BLACK LADYBIRD.

Rhizobius ventralis.

[Plate III.]

This valuable little ladybird is one of Mr. Koebele's last importations from Australia, and was successfully bred by Hon. Ellwood Cooper, at Ellwood, Santa Barbara County. It is jet black, but covered with short fine hairs that give it a dark gray appearance. The male measures one eighth of an inch in length, and the female three sixteenths of an inch.

Mr. Cooper received a few pairs alive of this ladybird in May, 1892, and during September, 1893, they had increased so that they practically stamped out the black scale (*Lecanium oleæ*) in the olive orchard where he placed them. During the second week of October he distributed, upon application, 453 colonies of from twenty-five to fifty ladybirds in each. Another distribution will be made in May next. December 23d, Mr. Cooper wrote in regard to this ladybird: "I find that the larvæ of all sizes are plentiful." This will show that they breed through nearly the entire year. As the black scale is distributed through all the coast counties of the central and southern districts, this little beetle will ultimately prove as valuable as the *Vedalia cardinalis*. Reports from a number of the parties to whom colonies were sent have been received, stating that the larvæ are plentiful on the trees where the beetles were placed.

The illustration will give a good idea of the appearance of the larvæ. The natural size is indicated by the line at the side. They are dark gray and fringed with short spines.

AUSTRALIAN LADYBIRD.

Vedalia cardinalis, Mulsant.

[Figs. 8, 9, 10, 16, and 17, Plate II.]

The introduction of this little ladybird into California saved the citrus industry from destruction by the Australian "cottony cushion scale" (*Icerya purchasi*). The orange growers of Los Angeles County especially had a very expensive experience with this scale. As it had spread into the wild bushes and trees, extermination by artificial means was out of the question. Now the scale has a hard struggle for existence. When it appears in an orchard the owner is supplied with a colony of the *Vedalia* and requested to forward a box of the scale-infested branches to supply our colonies in the breeding jars. Fig. 9, Plate II, represents the larva or young; Fig. 10, the chrysalis, and Fig. 8, the perfect beetle, natural size. Figs. 16 and 17, enlarged, give a better idea of the markings of the beetle and larva.

During the summer the transformations of this ladybird are very rapid. From the egg, through the larva and chrysalis, to the perfect beetle takes only twenty-one days. Of course, the larvæ are the most active feeders. When short of food they will attack each other, but no matter how hungry they are they will not eat any other species than the cottony cushion scale. This ladybird breeds throughout the year.

A LEPIDOPTEROUS ENEMY OF THE BLACK SCALE.

Thalpochares coccophaga, Meyr.

[Figs. 6 and 6a, Plate I.]

The chrysalis of this moth was sent by Mr. Koebele, in the spring of 1892, from Toowoomba, Australia. During May and June the moths issued and were liberated on orange and lemon trees infested with "black scale" (*Lecanium oleæ*), at Haywards, Alameda County. A

colony was placed at Ellwood, Santa Barbara County, and several colonies went to Los Angeles. Nothing has been seen of either lot, but I have no doubt but that they will be found the coming season, as they were in good condition when turned loose. We had a similar experience with the Australian fly (*Lestophonus iceryæ*). Nothing was seen of the latter for over two years after it was imported. The larvæ of this moth travel along infested twigs, destroying the black scale as they go, using the dry scales as a protection to their naked bodies and covering to the chrysalis.

LACE-WINGED FLY.

Chrysopa Californica, Coquillett.

[Figs. 11, 13, 14, 15, and 29, Plate II.]

The larvæ of this beautiful pale green fly are predaceous, destroying aphids and other soft insects. Unfortunately they do not discriminate, but kill the young of ladybirds and other beneficial insects. They are found throughout the State, but not very plentifully, as they are preyed upon while in the pupa stage—Fig. 29, Plate II—by an internal hymenopterous parasite.

BROWN LACE-WINGED FLY.

Hemerobius.

[Fig. 19, Plate II.]

This resembles the preceding species, but differs in color, being brown instead of green. The larva, after having extracted the juices from its victim, throws its head backwards and attaches the skin of the aphid to its back, thus forming a covering for its body, and to some extent a protection against insectivorous birds.

SPINE-LEGGED SOLDIER BUG.

Sinea spinipes, Herrick-Shaefer.

[Fig. 18, Plate II.]

This insect, both in the larval and adult stages, feeds upon aphids, caterpillars, and other soft-bodied insects. Even the larvæ of the ladybirds are attacked by them, so they are both beneficial and injurious. They are furnished with a short, stout proboscis, with which they kill their prey and extract the juices. Like the mosquito, they inject a poisonous fluid into the wound, and a bite from them will produce great pain and cause the part to swell.



Improved apparatus (No. 1) for treating citrus trees with hydrocyanic acid gas.



Improved apparatus (No. 2) for treating citrus trees with hydrocyanic acid gas.

GRAY SOLDIER BUG.

Euschistus tristigmus, Say.

[Fig. 12, Plate II.]

Like the spine-legged soldier bug, this insect is predaceous, and destroys plant lice and caterpillars. They are dark brown in color. Their proboscis, when not in use, is folded under the breast.

SYRPHUS FLY.

Catabomba pyrastris, Linn.

[Fig. 30, Plate II.]

These flies, as shown by the illustration, resemble wasps. During the spring and summer they can be seen hovering near plants or trees infested with aphids, amongst which they deposit their small, light-colored, oblong eggs, usually one in a place, unless it is a very large colony of aphids. This is a wise provision of nature, as the larvæ, or young, are totally blind. As soon as hatched the young maggot feels around until it strikes an aphid, which it will seize and suck the juices therefrom. As they increase in size and strength they raise the aphid from the twig or leaf. The larvæ are sometimes gray, changing to green. The smaller end is the head. When about to change to the chrysalis, they attach themselves to the leaf, the body becomes shortened, distended, and pear-shaped.

X.

GAS TREATMENT FOR DESTROYING SCALE INSECTS UPON CITRUS TREES.

Hydrocyanic acid gas is still considered the most effective means of combating the "red" (*Aspidiotus aurantii*), the "purple" (*Mytilaspis citricola*), and other armored scales that have as yet no effective parasite to keep them in check. This gas is produced by the chemical action of sulphuric acid upon cyanide of potassium. The proportions of chemicals necessary for different sized trees near the coast and in the interior are given in separate tables.

To prepare the gas, the following instructions must be carefully observed. This gas is deadly, so care must be taken not to inhale it as it issues in a volume from the generating pot. When mixed with the air there is less danger, but at no time should the operator breathe it. In removing the tent from the tree after treatment, the men should stand to the windward, but usually this gas is all condensed or spent before it is necessary to transfer the tent to another tree, so that there is really no risk. Place the necessary amount of cyanide of potassium, together with sufficient water, in an earthenware vessel; when the tent or canvas has been put over the tree and everything is in readiness, place the vessel under the canvas and add the sulphuric acid; a piece

of sacking or burlap should be thrown over the top to spread the gas and prevent it from burning the leaves immediately above the generator. The tent must be made air tight around the bottom as soon as the acid is put in. This can be done by simply throwing some loose soil over the bottom of the canvas. Some operators prefer to mix the acid and water first and drop the cyanide in last. The brand of cyanide of potassium that has given the most satisfaction and most uniform results is the fused (60 per cent), manufactured by Powers & Weightman, of Philadelphia, Pennsylvania. It should not be left exposed, as it has a strong affinity for water and withdraws the moisture from the air, thus adding considerably to its weight.

The following table, giving height of trees and the proportions of chemicals and water, will be found suitable for districts in the interior or beyond ten miles in a direct line from the sea coast:

Height of Tree—Feet.	Diameter through Foliage—Feet.	Water—Fluid Ounces.	Sulphuric Acid—Fluid Ounces.	Cyanide of Potassium—Ounces.
6	4	2	1	1
8	6	4	2	2
10	8	6	3	3
12	10	10	5	5
12	14	14	7	7
14	14	16	8	8
16	16	18	9	9
18	16	20	10	10
20	16	22	11	11
22	18	24	12	12
24	20	26	13	13
26	20	27	13½	13½
30	20	28	14	14

One would suppose that a tree having a dense foliage would fill up the space within the tent and require less gas to be effective. But the cold surface of the leaves condenses the gas, and fumigators find that a slightly heavier charge of chemicals is necessary for such a tree, and where the foliage is scant a less amount than is given in the table will answer. Some orchardists and fumigators consider that the work has not been effective unless some of the leaves or tender twigs have been injured. This is not necessary, for in our early experiments we have treated trees and killed the scale without even injuring the most tender twig or blossom. As the trees recover very quickly, even when seriously scorched, a slight burning is no detriment and is evidence that the work has been effective, except in the case of "black scale" (*Lecanium oleæ*), during the early summer when the eggs are under the females. The proper time to fumigate for this scale is during the fall or early winter, when they are in the larva state.

Mr. T. B. Johnson, formerly of Riverside, superintended the fumigating work carried on by the San Diego Horticultural Board during the past season in the bay district, and after experimenting with the same grades of cyanide of potassium and sulphuric acid, found it necessary to increase the amounts on large trees in order to do good work. The following table was finally adopted by him for use near the coast. We have had the same experience in disinfecting imported stock in the bay district of San Francisco:

Height of Trees— Feet.	Diameter through Foliage—Feet.	Water—Fluid Ounces.	Sulphuric Acid— Fluid Ounces.	Cyanide of Potas- sium—Ounces.
6	4	3	1½	1
8	6	6	2½	2
10	8 to 10	12 to 15	4 to 5	3½ to 4½
12	10 to 14	18 to 26	6 to 8¾	5 to 7
14	12 to 14	26 to 30	8¾ to 10	7 to 8
16	14 to 16	33 to 37	11 to 12½	9 to 10¾
20	16 to 18	48 to 56	16 to 18¾	13 to 15
24	18 to 20	67 to 75	22½ to 25	18 to 20

The cyanide should be used as coarse as possible, so that the chemical action will be less violent. The gas is also generated more evenly and there is not so much danger of the chemicals boiling over or spattering the tent. The tent should remain closed for not less than forty minutes. This time is required to kill the eggs of the armored scales. As soon as the tent is removed the vessel should be rinsed with clean water and prepared for another charge, while the men are changing the tent.

Los Angeles County has the largest and best fumigating outfit in the State. During the fumigating season two crews of four men each are detailed for this work, under the direction of the County Horticultural Commissioner. One crew operates with the "bell-tents" (Plate XXXVIII) upon trees under 14 feet high. R. T. Mullard had charge of this outfit, and with 29 tents 7½x6½ feet has treated 318 trees in one night, commencing at 5 P. M. (in October) and working twelve hours. With the same number of men and 16 tents he has fumigated 224 orange trees 10x12 feet. The tent used for this size tree is bell-shaped, 16 feet high by 32 feet in circumference. The tent in passing down over the tree brings the branches together without damaging them. The tent requires no other support than the tree. To keep the mouth of the tent expanded, and to facilitate moving it from tree to tree, the bell-tent has a large hoop made of half-inch gas-pipe; to connect the ends a short piece of larger pipe is used, through which two holes have been drilled. Corresponding holes are made in the hoop; through them are passed nails, which are clinched; this completes the circle. One foot from the bottom of the tent straps of canvas are sewed, and through them the gas-pipe is passed. In removing the tent the hoop is raised, one side is elevated over the top of the tree in the direction of the tree to be treated, turning the tent outside in. The apex of the tent is supported by a pole, at the end of which is a four-inch crescent-shaped iron rest. The two men handling the hoop pass it over the next tree and it is ready for gasing.

THE SHEET-TENT.

[Plate XXXVII.]

This is a very simple arrangement and has greatly reduced the cost of a fumigating outfit. The most successful operating fumigators heretofore have been modeled after the "Wolfskill" design—the first built. The "Titus," "Culver," and "Dobbins" fumigators could only be used successfully with one tent, so it was rather a slow business. The rolling stock and rigging connected with the "Wolfskill" and "Preble" apparatus made them too expensive, so a simpler and cheaper system of

covering large trees was a necessity. The sheet-tent and poles were the outgrowth of a suggestion made by Dr. J. H. Dunn, of Pomona, to Mr. Finch and Mr. Miller, of Riverside, with a few modifications by others since. The illustration is one of the Los Angeles outfits at work in Covina orange grove. The two poles, or uprights, are of dressed Oregon pine, 2x4 inches and 24 feet high. Across the bottom of the poles are bolted—one on each side—two pieces 1x3 inches and 6 feet long. From each end of the cross-pieces a brace, 2x4 inches and 4 feet long, is fastened to the upright pole. The cross-bar prevents the pole from falling sideways when raising the tent over the tree. A $\frac{1}{2}$ -inch guy rope, 33 feet long, is fastened at the top of each pole in front. A 4-inch block is fastened in the rear at top, and another block where the braces join the upright; through these is passed a $\frac{3}{4}$ -inch rope 70 feet long, to raise the tent. Instead of the rope with rings sewed to the canvas, to which a hook was attached for raising the sheet, the edge of the sheet is gathered and a hitch with the rope around it makes it fast, so it can be drawn up. This obviates the necessity of placing the sheet in a certain position and right side up, so it is a great saving of time. When all is ready the sheet is dropped on one side of the tree; the uprights are raised, one on each side; the ropes are adjusted to the edge of the sheet, and hoisted; each upright is steadied by a man with the guy rope. When raised sufficiently, the men pull on the guys, thus bringing the sheet forward and over the tree. The uprights are allowed to drop on the ground, leaving the tent in position. In operating, take the same number of rows of trees and tents that you can adjust within the forty or forty-five minutes required to gas a tree. In this way no time is lost. One set of uprights will answer for all the sheets. The sheets are made octagonal, and the sizes used are 32, 48, 52, and 60 feet in diameter.

FORMULA FOR PAINTING FUMIGATING TENTS.

In order to make the canvas used for fumigation perfectly air tight, to prevent the gas escaping, the tents have been treated with a light coat of boiled linseed oil. The great objection to the oil has been that it had a tendency to stiffen the canvas and add considerably to its weight, so a cheaper and more flexible preparation was sought. The following mixture, used by Commissioner Scott, of Los Angeles County, during the past season, made the tents gas tight and left the canvas soft and pliable. The chief essential ingredient is a supply of common prickly-pear cactus (*Opuntia engelmanni*) that grows in abundance in the southern counties of the State. It is the flat leaf species, and parties living in sections to which it is not indigenous could have it sent in boxes. To make the cactus extract, chop up enough cactus to fill a barrel two thirds full, then fill up the barrel with *cold* water. It should stand for twenty-four hours, when it will be ready for use. Do not prepare more than is required for immediate use, otherwise it will sour and become worthless. Stir well, then strain ten gallons of the liquid into another tub or barrel; dissolve two pounds of common glue and add to the cactus extract, with sufficient yellow ocher or Venetian red to give it a good body. After thoroughly mixing the ingredients, it is ready for use. Both sides of the canvas should be painted, and the dressing well rubbed into the fiber with a flat paint brush. If oil is used, the canvas should be spread out and thoroughly dried before it is rolled up, or it is liable

to be destroyed by spontaneous combustion. When dry there is no danger from this.

Dr. J. H. Dunn, of Pomona, a successful fumigator, dips all his tents in the following tannin solution, combined with the cactus preparation, and finds that the tents so prepared are more durable. He prepares the cactus and yellow ocher mixture as directed above. His method of treating the canvas or tents is as follows: He has a tank 8 feet long, made with sheet-iron bottom and plank sides 20 inches high. This is set on brick walls forming a fireplace and flue. Into this boiler he puts one sack of chopped or ground oak bark and one pound of catechu, covered with water and boiled for two hours, to extract the tannin. Then the cactus mixture is poured in and boiled for a short time. The tent is rolled up loosely and put into the hot solution, where it remains over night. In the morning it is hoisted with a block and derrick and allowed to drain and afterwards spread out to dry. Besides protecting the canvas from mildew and rot, he states that the hydrocyanic acid gas has no injurious effect upon the cloth.

In order to be successful in fumigating with hydrocyanic acid gas nothing but the best and closest texture of canvas should be used. Every day the tents should be carefully inspected to see that there are no holes, for no matter how small they are the gas will pass out and the work may be ineffective.

COMBINED REMEDY FOR CODLIN MOTH AND APPLE SCAB.

The Paris green solution has almost entirely superseded the band and trap system of fighting codlin moth (*Carpocapsa pomonella*). No matter how carefully the bands and traps were attended to, enough larvæ escaped so that there appeared to be as many wormy apples or pears the following season as before. With Paris green we destroy the worms before they have damaged the fruit. This is certainly more satisfactory to the orchardist, and requires less attention and work. Paris green is preferable to London purple, as it is insoluble in cold water, and therefore less injurious to the foliage. No ammonia or soap should be used in the solution. In the Eastern States a stronger spray can be applied without injury. But in California we find that one pound of Paris green to two hundred gallons of cold water is as much as the foliage will stand. The poison should be made into a paste before placing in the tank, and during the operation of spraying it should be *constantly* stirred.

If any indications of "apple scab" (*Fusicladium dentriticum*) are observed, the following can be added to the Paris green solution: Dissolve twenty-five pounds of sulphate of copper in twenty gallons of water; slack twenty pounds of fresh lime; add to the copper solution, and strain into the spray tank with the Paris green, making two hundred gallons of wash. This should be applied with a fine spray, and only sufficient used to each tree to thoroughly moisten it without running off. If the mixture has been constantly stirred, this will distribute sufficient Paris green over the young fruit to destroy the larvæ of the codlin moth before they burrow. The spraying should be done soon after the blossom drops, and before the fruit turns downward. A second application should be made about sixteen days after the first, and in some districts a third application (of Paris green), at three weeks interval from the second, will be beneficial.

TRANSACTIONS

OF THE

SIXTEENTH STATE FRUIT GROWERS' CONVENTION,

HELD AT

SAN JOSE, NOVEMBER 15-18, 1892.

XI.
TRANSACTIONS
OF THE
SIXTEENTH STATE FRUIT GROWERS' CONVENTION

HELD UNDER THE AUSPICES OF THE
STATE BOARD OF HORTICULTURE AT SAN JOSÉ,
NOVEMBER 15 TO 18, 1892.

CALLED TO ORDER.

Hon. Ellwood Cooper, of Santa Barbara, President, called the convention to order. He briefly explained the call for the convention issued by the State Board of Horticulture, and introduced Rev. R. S. Cantine, who opened the exercises with prayer.

VICE-PRESIDENTS.

Col. Philo E. Hersey and Col. R. P. McGlinicy, of San José, were chosen Vice-Presidents.

ADDRESS OF WELCOME.

By HON. S. F. LEIB, of San José.

MR. PRESIDENT, LADIES AND GENTLEMEN: I feel myself incapable of giving you a description of this valley. Originally it was a sea. This was before there was a Golden Gate. The geologist tells us that in those times this inland sea covered not only this valley, but what is now the great valleys of the Sacramento and the San Joaquin. Into it flowed the waters of the Sacramento, San Joaquin, and other rivers, and it found its outlet through the southern end of this valley and thence on through the Pajaro Valley to the ocean. Just how near the water stood to the top of the lowest gap of the Coast Range opposite the present bay of San Francisco we cannot even surmise, but eventually it became high enough to pour through this gap, and the Golden Gate was probably then soon made. Large tracts of land were thereby drained and made dry. The rich soil of our surrounding mountains was washed into the basin where the water had been, and made this valley what it is. This is proven by the further fact that in boring our artesian wells, we frequently find redwood trees hundreds of feet below the surface. When I came here, nearly a quarter of a century ago, Santa Clara Valley was one vast grain field. I cannot recollect of then seeing an orchard having in its limits as much as ten acres. Now, behold the change! Where

now are those vast grain fields? Even you who were in attendance at the convention of this society some eight or ten years ago, will be astonished at the change since then. As an illustration of this, I may state that I had just planted an orchard in the western edge of this valley on what is known as the Stevens Creek road. That road is eight miles long and as straight as an arrow. Not a single orchard then fronted on this road but my own. Now there is not one quarter of a mile of it, all told, that has not an orchard or vineyard fronting on one or the other side of it, and generally on both sides. I had occasion last spring to drive an Eastern friend around a portion of this valley, and we agreed before starting, to keep account of all portions of the road that had no orchard or vineyard fronting on one or both its sides. That drive extended between twenty-five and thirty miles, and at its close we found that there was much less than one mile in all not fringed by orchards or vineyards.

Last year we shipped over 1,000 carloads, counting ten tons to a carload, of dried prunes alone from the San José depot. Should we have a full crop next year, we will ship 2,500 such carloads of that fruit from that depot. Colonel Hersey, a very intelligent fruit grower, makes a conservative estimate that from the trees now planted in this county we will produce annually over 200,000,000 pounds of dried prunes. Some idea of the enormous extent of that particular industry in this valley may be obtained when we remember that the annual consumption of prunes by the United States is only from 50,000,000 to 60,000,000 pounds, and has never yet reached 100,000,000 pounds, even in the years when they were very cheap. And yet, second only to our prune industry, is that of our apricots, our peaches, our pears, our cherries, and various other fruits.

I have said this much of our valley, not in vaunting praise, but that you may see that we are a community of fruit growers, and hence that you have come to a community of friends. In such a community, it goes without saying that you are more than welcome. We welcome you most heartily and unreservedly, and we mean every word of it. We go beyond that, and extend to you our most heartfelt gratitude for holding your convention here, where so many of us can profit by your wise deliberations. In conclusion, we assure you that nothing will give us more pleasure than to feel that you have enjoyed your stay while sojourning with us.

THE PRESIDENT'S ANNUAL ADDRESS.

By HON. ELLWOOD COOPER, of Santa Barbara

This is the Sixteenth State Fruit Growers' Convention, and the twelfth held under the auspices of the State Board of Horticulture. At the last convention, held at Marysville, one year ago, I was not present, for reasons beyond my control. It was a great deprivation and deeply regretted by me. These meetings form an important part of my life, and I must express to you my gratitude for the privilege of meeting you and feeling that we are friends united in our efforts to promote the best interests of horticulture. While our special purpose is to interchange ideas and discuss the fruit problem, we are developing other interests

and effecting results more important even than the successful culture of fruits. The harmony and unity of feeling and purpose always present, that have governed our deliberations, are creating a public sentiment, and on our maintaining the same unselfish interest in the general welfare will eventually become a controlling interest in State affairs.

In reviewing the proceedings of the last convention, we find an increasing and deeper interest manifested. It is very gratifying to the members of the State Board to feel that their efforts are appreciated. This encouragement will stimulate them to make greater exertions toward meeting the demands of fruit growers to the fullest extent.

It will be appropriate in this place to mention that we had hoped to have our Report for 1892 ready for distribution at this convention. We have succeeded in getting only a few partial copies, which are present merely to show the character of the work. By the middle of December or earlier, they will be ready for distribution. The report will cover from five hundred to six hundred pages. This volume is different from any of the previous reports. It contains two maps, which have been prepared with great care. It speaks of the geography, topography, and the climate of California, giving the horticultural history of the State, the progress, the adaptability, and the actual condition of all the fruits grown in every county in the State. This is a book for distribution to Eastern people who anticipate coming to California to make homes. The State Board of Examiners have thought so well of it that they have ordered 10,000 extra copies—in all 20,000—that our Board might distribute them broadcast throughout the East. Of the 10,000 for distribution in California, 2,000 copies will be required for the different departments of State, for members of the Legislature, and for the uses of the Board. The remaining 8,000 copies will be for distribution to the fruit growers in the fifty-four counties. I would suggest that the Horticultural Boards of the different counties send in their applications, with the lists of the fruit growers in their several districts who ought to have this work, in order that we may prorate the distribution so as to do equal justice to all parts of the State.

The Secretary of State has requested that the lithographic plates producing the maps be purchased and preserved, that said maps can be reproduced for other departments. I regret to state that we have not the money that can be applied to this purpose. Possibly we may get the parties to delay their destruction until some provision can be made. The Superintendent of State Printing has written us, under date of the 12th, that the report is stereotyped, so that it can be reproduced at any time.

The members of the convention will understand that our work is increasing and extending in every direction. The appropriation is inadequate to meet the necessities of progressive development.

I have from time to time on previous occasions called your attention to the questions that appeared to concern us most. At this meeting I will briefly mention some of the subjects for discussion presented in the programme, and refer you more particularly to the address of our Vice-President at the opening of our last convention, held one year ago, to be found on page 368 of Report for 1891. Better quarantine laws were therein recommended. The subject of canned fruits, false labels on worthless fruits, and a system of inspection, besides other important questions, were brought to the notice of the convention, all of which still concern our success.

Regarding the appropriation of \$5,000 for the purpose of searching out predaceous insects to destroy insect pests, I should like to say here that Mr. Albert Koebele has, to the best of his ability, performed this service, and with very encouraging results. His report will be presented to you.

It is my opinion that the beginning of the end has dawned, and that devastation by insects will soon be a thing of the past, as far as those insects are concerned that are now here and troubling us. If we are cautious and determined in not letting any new insects establish themselves, we will be saved from further spraying and expensive remedies. This method of counteracting the depredations of insect pests is new. It has not been practiced at any period in the world's history, and if we carry out the project to its full completion, the fruit growers of California will be credited with one of the wisest measures ever encouraged or instituted. Its importance will be lasting through all future civilization. No measure so strongly recommends itself to the intelligent legislators as this, and it is to be hoped that at the coming session such aid will be granted as will permit the State Board to carry out the plans they have projected, so that the final solution may be reached. Five thousand dollars per year for the next four years would be a sufficient sum to keep Mr. Albert Koebele constantly at work. I am confident that a parasite for every noxious insect will yet be found and colonized in California. It would save many millions to the fruit growers, would advance the prosperity of the State more than any other one thing, and would develop thought in other directions, because it deals with the economy of nature, and brings us in closer relations with the Deity. I recommend that a committee be appointed to urge this matter in the coming Legislature.

Before leaving this subject, I call your attention further to my address before the fruit growers at the convention held in Los Angeles, where mention was made of the enemy to the grasshopper. (See Report 1890, page 40.) There does not appear to be any doubt but that the insect *Bracon capitata* would prove an effectual remedy to the devastation caused by the raids of grasshoppers. It is our duty to search for and introduce this parasite. In an article written by Charles Naudin for the "Garden and Forest" (December, 1890, page 625), it is stated that the pigmy owl, known in France by the name *Cheveche*, is an effectual enemy to the excessive multiplication of the European sparrow; also that the great owl, *Stryx bubo*, is the special enemy of rabbits. We should procure these birds and introduce them into the San Joaquin Valley, where suitable houses could be built for them at a very slight expense. I would also suggest the introduction of wild cats, a most successful enemy to all kinds of rabbits. Local laws could be made to protect these animals while the country was being rid of the devastating pest known as the jack-rabbit.

The present methods for the disposal of our fruits are very imperfect, resulting in unsatisfactory results to the producers as well as to the consumers. They have not improved as was anticipated. We discussed this subject very fully at the Los Angeles convention held in November, 1885, and at every convention held since then. Now let us act. I beg to call your attention to the essay of David Lubin, read at the Marysville convention, to be found on page 418, Report of 1891, and the discussion following. In considering this subject, I suggest that the railroad question be eliminated. Let us deal with this branch entirely separate from every other subject that comes before the convention.

On previous occasions I have called attention to forest culture, a branch of our industries, and one that concerns the very existence of the human race. The starvation in Russia, so fresh in our memories and so alarming, a calamity so appalling, should cause us to think, and, if possible, arrest a similar danger that may occur here. A very interesting essay on this subject, by Abbot Kinney, is to be found on page 141 of Report of 1890. I also refer you to the "Garden and Forest" of April 6th, page 157, of August 24th, page 397, and of August 31st, page 417. You will pardon me for quoting from the latter as bearing directly upon the question of starvation in Russia:

"The regions of the mighty rivers the Don, the Volga, and the Dneiper were formerly fringed with wide-spreading forests along their whole upper and middle courses, which sheltered their sources and tributaries from evaporation throughout the year. These forests have now for the most part disappeared. Mile after mile the traveler sees nothing but low shrubs and melancholy stumps in unbroken succession. * * * The city of Pottawa lies on the banks of the once noble Worskla. It was at its mouth that the Swedish army surrendered to Peter the Great. This stream, which fertilized a broad region, supporting a numerous population, exists no more, not temporarily run dry, but with all its springs exhausted, so that in future it may be stricken from the map. The Bitjug, another river in the Don region, the upper course has wholly disappeared, valley and bed are filled to the banks with sand and earth. As if by magic wide fertile lands are buried under the sands and whole villages desolated. * * * The extension of the railways afforded an opportunity for extracting colossal fortunes from these forests. * * * The Government and people of Russia had already been warned forty-two years ago and commanded to protect the forests, sow, plant forests, and protect them with rigorous laws. The Volga and the Don, and all the rivers of southern Russia, will be silted up and disappear unless the forests be protected. More fatal even than the drying up of the streams is the cessation of the spring and summer rains. This is the immediate cause of last year's harvest failure."

Now, my fellow citizens, will we permit this devastation to go on in our own country? I recommend the passage of resolutions urging the United States Congress to pass Senator Paddock's bill, "to provide for the establishment, protection, and administration of public forest reservations, and for other purposes."

I call your attention to the proceedings of a convention of olive growers, held in San Francisco on the 21st of July. A committee was appointed on legislation, to obtain, if possible, such amendments to the Pharmacy Act and to the Olive Oil Act as would secure the enforcement of these laws. I recommend that this convention ratify the appointment of this committee, or appoint a separate committee to act jointly with them. The names will be found on page 42 of the report of the proceedings.

The amended act of the vagrant law, as passed by the last Legislature (Statutes of 1891, page 130), does not provide any special law as to arrest, this part being left to the general law of criminal procedure, Chapter V, page 182, of "Codes and Statutes of California." This law has not been effective. It could not be expected that a farmer or fruit grower, especially in a busy time, could follow a vagrant ten, fifteen, or twenty miles to a police court to identify him and have him punished; nor, on the

other hand, that each farm or orchard should have a deputized officer clothed with the power to make arrests. A vagrant population tramping over the country without any visible means of support, begging from house to house, is a detriment to the farmer and fruit grower, as well as to every industrial pursuit, and it ought not to be permitted. The law should be so amended that the local officials in every district could be empowered and compelled to arrest every wanderer of this class. The peace, comfort, and happiness, especially of the rural population, demand it; and the best interests of the wanderers themselves, a no less important consideration, would be promoted by this means. I recommend the appointment of a committee to secure an amendment to this law that will effectually put a stop to this evil.

At the Marysville convention a committee was appointed with power to act as an advisory committee to the World's Fair State Commission (see clause third, page 414, of Report of 1891); also, under fourth clause, same page, the resolution in favor of a reissue of the State Board's reports, in a condensed form, from 1885 to date. I have no knowledge of what the committee has done toward the encouragement or the securing of a creditable fruit display, but I feel that we should take some action at this convention to impress upon the fruit growers the importance of making our greatest efforts on this occasion. The reissue of the State Board's reports, previously recommended, is desirable for several reasons: a number are wanted for reference in the schools; the increased number of fruit growers desire the information contained in them, but who cannot obtain copies, the entire issue being exhausted; and a number should be at hand for distribution at the Columbian Exposition. No work could reflect more credit upon the California fruit growers than such a book. If this Legislature act quickly, there is time to get ready a thousand copies for that occasion. It is as important as literature on any other subject, for it represents our intelligence, and as a horticultural work has not been equaled by any other State or any other country. The Legislature could prescribe the conditions of their distribution. The Superintendent of the Department of State Printing has given us the estimate of cost of 30,000 copies, the number we recommend to have printed, as follows: Paper, \$4,900; composition, \$2,400; presswork, \$2,000; binding, \$2,200; total, \$11,500. Handling expenses, boxes, drayage, and workmen, about 3 per cent, or an aggregate for the total number of 30,000 copies, \$15,000; lithographing would cost about \$5,500; compiling would cost \$2,500; making an estimated expense of \$23,000. A sufficient number could be turned over to the Superintendent of Public Instruction for the public schools, and, after presenting a few copies to each foreign Government represented at the Columbian Exposition, and a few copies to each State department, the remainder could be sold for the benefit of the State, at a price that would meet the entire expense. I recommend that a committee be appointed to have the matter brought before the Legislature.

Simon Sterne, one of the best writers on railway service, said: "Of all the factors that have contributed during this century to the growth of wealth, to the increase of material comfort, and to the diffusion of information and knowledge, the railway plays the most prominent part. It is not, however, an unmixed good. It causes cities to become overcrowded. It takes away the independence of the individual workman; it makes the handicraftsman part of a huge machine, and compels the

workman to give his time more and more to smaller and smaller parts of the whole operation necessary to produce a given result."

Every country which has allowed the railway to be built by private enterprise has fostered a class of unscrupulous operators, furnishing them the means of achieving great fortunes. Absence of governmental supervision in the stock capital of railways has caused the placing on the money markets of the world of a vast quantity of fictitious values not representing actual constructions in money value. At the very outset of railway development, Stephenson, who was as wise a statesman as he was an engineer, insisted that railways should be taken in hand and operated by the Government, claiming that from its nature and character it was a highway which would in time become more important than the ordinary road. In terse language he expressed, before a committee of Parliament, his opinion, that competition would not be the means of producing in this case, as it does in others, the cheapest and best results for the community, because, said he, where combination is possible, competition is excluded.

Mr. James Morrison, in a speech delivered before the British Parliament, in 1845, said, regarding the rates of toll, that he would determine the rate in every case by the sum at which the particular line of railway could now be constructed. The public are not bound to inquire what the line has really cost, but merely to ascertain the sum for which it could at the present time be constructed, and the railway proprietors ought to be compelled to carry the public and their goods for such fare as would yield a fair profit upon such outlay.

In Belgium all concessions for constructing railways are granted by the Minister of the Interior, subject to the ratification of the Chamber of Deputies and of the King. The expectant corporators offer a plan, giving the line of the route, estimates of its revenue, and the probable expense of the undertaking, together with a tariff of tolls for passengers and freight traffic. This is submitted to competent engineers, and all verifications of the calculated costs of the projectors are made at the expense of the latter. Then for a period varying from one to three months the whole plan is advertised. After these reports, a hearing is had, at which the engineering work, the guarantees for its execution, the rate of charges by the company, the time for which they may be demanded, and the time within which the work is to be commenced and finished, are specified. After all these questions have been settled, the whole matter is then submitted to the Chamber and Senate and the King, any one of whom can alter it before it becomes a law. All the main lines are owned and operated by the Government. In 1850 the Government owned 64 per cent and private individuals only 36 per cent of the roads. The Government may at any time, if a line becomes profitable, buy it up, as under the terms of every concession the road is subject to purchase by the State for the benefit of the commonwealth. The purchase price is the net receipts for the last seven years of the company's working, from which the receipts of two most profitable years are deducted. It is needless to state that this system resulted in giving to Belgium the best and in every way the most efficient network of railway service on the face of the globe.

France.—In France the Government advanced large sums of money to the railways upon the condition that at the end of ninety years all the lines should become State property, the State to take the rolling

stock at a low valuation. All the rates of charges, for both passengers and freight, are regulated with the utmost minuteness. At any time before the ninety years expire the Government can purchase the whole at a capitalization of an average of fifteen years' income, after disregarding the two worst years, and taking as the minimum figure of the capitalization the lowest year immediately preceding the purchase. Every tariff of charges must be submitted to the Government for the purpose of receiving its sanction, and a month's notice must be given of any proposed change. Every passenger time-table is submitted to the Government for approval. No one interested in the stock of the railway, or in its direction, is permitted to make any contracts with the railway for supplies.

North Germany.—All concessions are made by the Minister of Commerce. Since the formation of the German Empire, the separate States have agreed to concede to the Empire the power of expropriation, and the new lines are to be constructed under the Empire.

Prussia.—All tariffs, for both freight and passenger traffic, must be submitted to the Government, and receive its assent. At the close of the war with France, the iron chancellor, Bismarck, had determined that the railways should become the property of the State, so that, in 1882, 9,500 miles belonged to the State, 1,320 miles of private lines were under State management, and 2,400 miles under private management.

Austria.—This country followed the course of France by making concessions for a period of ninety years to the railways. Its system of supervision, as to the tariff of both passenger and freight traffic, is complete.

Italy possesses a large majority of the mileage of rail within its territory.

Switzerland has an extremely effectual system of supervising the tariff of charges, which must exist on all her roads. In all these countries, therefore, the railway has never been regarded wholly as a matter of private enterprise.

An investigating committee appointed in New York State in 1879 made an exhaustive report. In alluding to watered stock they referred to the fact that it was proved before them that \$40,000,000 was probably the whole value of the property and equipment of the Erie Railway Company, and that \$25,000,000 more would cover the additional value of the road as represented by stock and bonds and interests in other corporations, while it was capitalized at about \$155,000,000. The construction account covered, in 1873, an item of "legal expenses" of \$891,000. The watering of the stock was estimated by the committee to be not less than \$70,000,000. From 1868 to 1870, by the consolidation of the New York Central and Hudson River railroads, \$44,000,000 was added to the combined capital of both. The fictitious capitalization of the railroads in the United States is a very difficult problem to deal with. There is no question but that the system is entirely vicious and caused by the public treating them as private enterprises instead of public ones. The aggregate capital of all the railways reaches something like \$8,000,000,000, or eight times the public debt; a considerable portion is in the hands or largely under the control of less than one hundred men. In any contest, therefore, between the Government and the railways, it is clear, that so far as mere pecuniary interests are concerned, the railway enterprises largely preponderate. On account of the

concentration of this great railway power in comparatively few hands, the extent to which they can corrupt the commonwealth is practically limited only by their will.

We have heard also considerable discussion about the burden of taxation in the last political contest. The greater portion of the time of two congressional sessions was taken up in discussing this subject; one, with the Mills Tariff Bill, the other with the McKinley Tariff Bill; yet, the whole amount of revenue resulting from the present tariff is not more than one half the tax levied on railroad transportation; and while the people throughout the country are conversant with all the arguments in support of one or the other methods, and have a voice in determining the adoption of the one or the other, they have no knowledge nor voice in the greater and more burdensome railroad taxation. There has been in New York City a small number of men, any one of whom could invite the others privately to his house, where by common agreement they could secretly raise the railroad tax 10 per cent, secretly telegraph it throughout the country, without the knowledge of any one excepting the various railroad companies, have it enforced and levied upon the industries of the country. There is no government, either republican or autocratic, on the face of the globe that could accept this evil in times of peace without bringing on a revolution. No community can safely pursue its course of happiness and well-being before such an insidious power. The citizens of the United States are therefore called upon to meet this question. There are two ways: one by civil laws, the other by revolution. Experience has proved that competing lines do not give relief, but, on the contrary, multiply the evils. We have, for example, five cross continent railways. Two could more than do all the work. We have therefore, practically speaking, more than double the tax on the industries by reason of the superfluous systems. No parallel lines running between two points should be permitted, where an existing line can do the service. The Government should own all the main lines, or at least have the control of them.

A franchise to a common carrier is not a local or State question. It should be limited entirely to the government of the whole people. Every citizen in the country who uses a common carrier, and all do, should have a voice in its creation and in its management. A citizen residing in Maine or Minnesota may use the California railroads to a greater extent than even Californians. It is a question belonging to Government, just as much as the national defense or the post office. Therefore, no franchise to a common carrier, at least on a main line of travel, should be granted except by the Government, and it should be guarded by such conditions that would protect the rights of every citizen, be for the public good, and be controlled by the whole people.

Monopoly breeds monopoly, hence the formation of trusts and syndicates; and like their parent model, they have their foundation in fraud, by fictitious capitalization taxing the public to reap a reasonable interest on fictitious values, furthermore acquiring power to govern prices, causing lower prices to the producers of the raw material, higher prices to the consumers of manufactured goods, and larger profits and accumulations to themselves. The machinery of the State government is amply sufficient for dealing with this evil. By amending our corporate laws, no incorporation should be granted, unless restricted to the extent that it could not transact business on a fictitious valuation. The purposes

of the projectors should be set out in their petition of application as to the extent of their business, with a limit to the profits to be derived therefrom; and unless it could be shown that by such unity of operators economy would accrue to the general public, the petition should not be granted. The books of the corporation, and the business management, should be open to the inspection of legalized State authority.

It will not be many years before our fruit shipments will be ten times as great as the present. The two questions of all-absorbing interest therefore are, first, how to dispose of the fruit, and second the rates of transportation. The present method of disposing of the fruits will not answer, because the commission merchants in the various localities have no direct interest in the prosperity of the fruit growers. Their interest is a selfish one, based upon the probable commissions they will receive for the time being, and not upon the ultimate result, which must affect every possible consumer seeking markets everywhere, that there may be no over-supplies nor waste. An employed interest directed by the fruit growers can alone secure this. We must sell our own fruits, otherwise serious losses can arise at any time from improper distribution. Rates of transportation must be fixed upon the basis as indicated in what I have outlined; that is, on the actual cost of transportation, with a reasonable interest on the capital invested; that is, on the actual cost of a system adequate to the demands, capable of transporting the fruits without delays, and not upon the fictitious valuations of the various superfluous systems.

Recess.

XII.

AFTERNOON SESSION.

President COOPER in the chair.

APPOINTMENT OF COMMITTEES.

The President announced the appointment of the following committees:

On Resolutions.—W. H. Aiken, E. W. Maslin, Frank A. Kimball, H. A. Brainard, R. O. Kells.

On Freight Rates.—L. W. Buck, L. Archer, John Rock, C. T. Settle, C. E. Reed.

On Legislation.—S. F. Leib, N. P. Chipman, William Johnston, Frank H. Buck, W. H. Aiken.

CO-OPERATION AMONG FRUIT GROWERS.

By A. L. BANCROFT, of San Francisco.

The basis of this paper is the plan for a State Dried Fruit Exchange, which has already been presented to the fruit growers of the State. More study has been put upon the subject and a few modifications have been made.

We hope at this time to advance further toward obtaining the desired results of effecting an organization than we have as yet done, and to leave matters in such a shape that work will proceed without interrup-

tion until either the organization is consummated or it is clearly demonstrated that it cannot be accomplished.

No plan has been presented as an improvement upon the one herein outlined, or as a substitute for it. If nothing is ready now to be offered, is it not in order to consider whether or not this one has sufficient merit to justify an earnest effort to establish it?

CALIFORNIA DRIED FRUIT EXCHANGE.

An organization in the interest of the producer.

The object is to furnish a medium through which to market California's product of dried fruit, figs, raisins, almonds, nuts, etc.

To shift the market places and concentrate the marketing at San Francisco in the place of having it sold at different places within the State, and consigned for sale to places outside of the State.

To do away with the competition of one county or section of the State with those of another, and also with the competition between individuals of the same locality.

To assist members in buying supplies of all kinds—lye, sulphur, trays, ladders, implements, etc.

To establish best methods of packing, shipping, etc.—and perhaps grades and brands, or marks, to indicate them.

To gather and disseminate valuable information among the fruit growers.

Board of Directors.—To have a Board of seven Directors, which shall be selected, as far as practicable, so as to have each prominent fruit-producing section of the State represented.

Compensation to each member of the Board, a fee of \$20 for each regular meeting attended, if he is strictly on time. Also mileage of 5 cents a mile each way from the county and return, for each regular or special meeting attended, if strictly on time. No additional fee for attendance at special meetings. Their compensation to be paid only out of the net earnings or surplus of the Exchange.

To have the management and control of the affairs of the Exchange; to fix salaries of all, except of themselves; to employ all of the assistants required, and to discharge them at their pleasure.

To establish uniform grades of dried fruit, etc.

To serve seven years, and to go out of office one at a time. The length of the first term to be decided by lot. Vacancies in the Board to be filled, until the first election, by the Board itself.

Regular monthly meetings. Special meetings on call of President or Manager.

The Board of Directors should be elected by ballot by the selling members—each \$100 of sales made during the preceding season to be entitled to one vote. The election should be held April 1st, of each year.

The first Board shall be elected by those who pledge themselves to sell their product through the Exchange the following season or year—1893. Each producer to have one vote.

The Board of Directors should elect the officers: President, Vice-President, Executive Committee, Manager, and assistants. The management of the Exchange should fall upon the Executive Committee, it being all the time subordinate to the Board of Directors.

Executive Committee.—To have an Executive Committee of three, to be elected by the Board of Directors from among its members. Weekly meetings from June 15th for six months, and bi-weekly meetings for the remaining six months, or say forty meetings in the course of the year; compensation, \$20 to each member for each meeting attended, and mileage, if strictly on time. A record to be kept of their transactions by the Secretary. Where the members are not unanimous upon any point, it may be dropped or referred to the Board of Directors for action.

A Manager, to devote his entire business time to the interests of the Exchange; to be Secretary and ex officio member of both Board of Directors and Executive Committee, but to have no vote in either body; compensation, \$200 per month, to be paid out of net surplus or earnings; two assistants—one at \$50 per month and one at \$25.

The Members of the Exchange to be of two classes—selling members and buying members. The selling members to pay a fee for the season of \$5, the buying members to pay a fee for the season of \$10. The Exchange to locate in rooms as near the State Board of Horticulture as practicable; rent probably about \$75 per month.

The Exchange to receive samples of dried fruits, etc., grade them, and to sell by sample, charging to the seller and buyer each a commission of $1\frac{1}{2}$ per cent, making 3 per cent in all to the Exchange. The commissions, or a part of them, to perhaps be deposited with the Exchange in advance, or the seller to be responsible for all, he to collect from the buyer at the time of sale.

The Exchange to effect sales by correspondence as well as in their rooms, charging the same commissions; the seller to furnish samples and the purchaser to pay transportation on them.

No samples to be accepted by the Exchange except from parties who contract to sell their entire product for the entire season through the Exchange. No one to be admitted as a seller for any season if he shall have made any sales previous to applying for membership. No dealer in dried fruits to be admitted as a selling member.

The Exchange to assume no responsibility as to goods agreeing with samples; that must be arranged for between buyer and seller. No goods to be consigned by the Exchange. The selling prices to be determined from time to time by the Executive Committee.

The "lots" of samples to be numbered; the buyer to pay his $1\frac{1}{2}$ per cent commission before receiving a card or certificate of the Exchange, showing that he has bought the "lot," and is given the name and address of the seller.

Should the goods not agree with the sample, or the buyer be not satisfied with them and will not take them, the Exchange to refund the commission paid.

The seller to pay to the Exchange his $1\frac{1}{2}$ per cent as soon as the sale is consummated.

The Exchange to issue bulletins to the seller weekly from July 1st to January 1st, and bi-weekly from January 1st to July 1st, giving statistics of sales made, goods unsold, etc., and market rates of dried fruits, etc., all over the world. The bulletins to be mailed in sealed envelopes. Accompanying the bulletins once a month shall be a blank form of report and ballot—on a postal card—perhaps to be numbered for the seller to fill out, showing the quantity of dried fruit he may have on hand and the prices at which he is in favor of offering it, but the prices

at which it is to be held are to be finally determined by the Executive Committee.

Lots of goods offered shall be listed at the Exchange in the order accepted, and shall be offered to the buying members in the same order. Perhaps make a separate list for each variety of fruit.

If goods remain with the Exchange unsold for a period of six months, the selling member is to be allowed to apply for and receive permission to offer them at private sale at any price he may desire, and if so sold the Exchange shall be notified, but the Exchange shall not be entitled to any commission upon them.

The Exchange to make the most favorable arrangements possible for the storage of goods while awaiting a purchaser, and also for the obtaining of loans upon them.

At the members' meetings only selling members shall be present or be represented by proxy. Buying members shall have no part in the management of the affairs of the Exchange. Buying members shall not hold proxies of selling members.

Proxies may be voted at members' meetings, but no person shall hold or vote at one time more proxies than those of one member.

The Exchange should organize at once and commence preparations. Applications for selling memberships to be solicited at once, conditioned upon business amounting to an estimated amount of not less than \$250,000 for the season, to be obtained before they shall be considered binding. Requests should be made in each notice published that producers send their names and address to the Exchange, in order that circular matter may be sent to them. Advertisements to the same end should be inserted in the trade papers.

ESTIMATE OF RECEIPTS AND EXPENDITURES.

Receipts.

Commission on \$250,000 sales, at 3 per cent.....	\$7,500 00
Fees from 500 selling members, at \$5	2,500 00
Fees from 25 buying members, at \$10	250 00
Total	\$10,250 00

Expenditures.

Board of Directors—twelve meetings, at \$100.....	\$1,200 00
Executive Committee—forty meetings, at \$60	2,400 00
Manager and Secretary	2,400 00
Assistants.....	900 00
Rent	900 00
Stationery, printing, postage, fuel, lights, etc.	2,000 00
Sundries, extras or surplus.....	450 00
Total	\$10,250 00

The \$250,000 worth of goods to be sold by the Exchange would be about one eighth or one tenth of the apricots, peaches, and prunes alone, to say nothing whatever of figs, raisins, grapes, almonds, nuts, etc. How much business it would be reasonable to expect might be done by the Exchange the first year, it would be difficult to say. If the sales were materially in excess of the amount named, the commission to the selling members should be reduced, or be cut off entirely, or they should have a drawback at the end of the year, which would materially reduce or wipe them out. The commission to the buying members should not be reduced. Upon the basis of five Directors, the estimated expenses were \$10,250, as above. With seven Directors, and a more pushing policy, say that the

expenses should reach \$15,000, \$18,000, or even \$20,000 a year, the 1½ per cent of the buying members alone on a business of \$1,500,000 would more than cover it all.

Subscriptions should be started at once to a fund to guarantee the expenses of attempting an organization. If the attempt is successful, the expenses would be met in the ordinary way; if not successful, they would be divided pro rata among the subscribers.

If an enterprise of this kind bids fair to succeed, there will be danger that the middlemen will try to find some way to strangle it, in order to protect their own interests. The possibilities of such an attempt resulting successfully should be very carefully guarded.

REFERRED TO COMMITTEE.

N. W. MOTHERAL moved that Mr. Bancroft's paper be referred to a committee of three, to report thereon to this convention. Carried.

The President appointed as such committee, N. W. Motheral, G. M. Gray, and E. F. Adams.

RESOLUTION.

WM. JOHNSTON offered the following resolution:

Resolved, That the address of the President be referred to a special committee of three, to be appointed by the Vice-President, and that the report of said committee shall embrace all the resolutions embraced in the address.

Adopted.

COL. PHILO E. HERSEY in the chair.

COLONEL HERSEY appointed Wm. Johnston, of Sacramento; Frank A. Kimball, of National City; and E. W. Maslin, of San Francisco.

THE LATE MATTHEW COOKE.

MR. JOHNSTON asked consent to present at this time a report of the committee heretofore appointed to erect a monument to Matthew Cooke.

Mr. President and Members of the Convention:

Your committee, to whom was referred the matter of providing means and erecting a suitable monument to the late Matthew Cooke as a mark of appreciation by the fruit growers of California, beg leave to make the following report: We have discharged the duty imposed upon us to the best of our ability by erecting a granite monument, the base of which is 6 feet by 4 feet and 7 feet 6 inches high, at a cost of \$585. We have collected \$462 in cash. Carlaw Brothers, the contractors, donate \$50, making total contributions \$512, leaving a deficiency of \$53, \$38 of which is due the committee and \$15 due the contractors.

Your committee desire the convention to contribute this amount of \$53 and discharge the committee.

WILLIAM JOHNSTON.
R. C. KELLS.
WILLIAM MCKINLEY.

The report was adopted, and the members present contributed the amount asked by the committee.

On motion, the committee was tendered a vote of thanks.

. NICARAGUA CANAL.

By EDWARD BERWICK, of Monterey.

Mr. President: I do not think that the farmers are sufficiently impressed with the importance of the Nicaragua Canal. At the present time our dried fruit must either go by car to the East or must go by the long sea route; the latter is a four months' journey, and if the canal were built it would be a four weeks' journey. Now our fruit must go over 7,000 miles of what they call the torrid zone—tropical heat; if that canal were built 2,000 miles of torrid zone would be all our fruit growers need to fight against. Now, there are two proposals before the United States regarding that canal: One is to have the great American nation build and own it and run it for the benefit of the American people, and the other is to have a company borrow the money of the American people to build that canal and charge such rates as they see fit. The cost of the canal, if built by the Government, will be about \$65,000,000. The company want to borrow from the Government \$100,000,000 and they are willing to allow the Government a minority in the company and they will boss the job. They say the American people cannot build that canal for various reasons: a treaty fifty years old, called the "Clayton-Bulwer Treaty," they say, prohibits us from having any interest, you might say, in Central America. That treaty was made with John Bull. Now, gentlemen, the conditions alter in fifty years, and I think you will find that John Bull has altered, too. It would be a source of gratification to John Bull to have that canal built; he has quite a few ships on the ocean, and he wants to get these ships to and fro as swiftly as he can. We are told there are other reasons to forbid our building that canal, but I want you to think about it—whether what six can do, the whole nation cannot do. I believe the whole nation is bigger and stronger and can do more than those six men, I don't care who they are, and I do hope that this matter will be fully considered.

Mr. BERWICK then introduced a set of resolutions, which were referred to the Committee on Resolutions.

TRANSPORTATION AND MARKETING OF FRUIT.

RESOLUTIONS.

Mr. BERWICK offered resolutions on the subject of transportation, which were referred to the Committee on Resolutions.

W. H. AIKEN, of Wrights: This question of transportation is one of the great questions of the day. A number of us some years ago organized the Fruit Union, and I believe that that corporation has done great good in the way of transporting the fruits of California to a profitable market. It was the intention of that organization to distribute widely and evenly the fruits of California, and to gather into its active support the fruit growers of the State, and it was supposed for a year or two that we had the active and generous support of them all; but unfortunately some of the largest growers decided to act independently of the Fruit Union, and in many instances the fruit of these large growers was

brought in actual competition in the same market with that of the Fruit Union. Resulting from this were low prices and some discouragement; but as years rolled on our prices have improved, and the work of the Fruit Union has become better understood. The difficulty is now that the Fruit Union can handle carloads and trainloads of fruit and carry them to the great distributing centers of the country, but as to the distribution of the fruit to the smaller cities and villages of our country, it has in a measure not accomplished what reasonably might be desired, and now comes the necessity of more general distribution. We will have to look to some other organization than the railroad or the express company, or even the Fruit Union. To my mind another organization might be formed, say of the fruit producers of the State of California, possibly under the name of the "Fruit Express Company," becoming a great express company for fruit, the same as Wells, Fargo & Co. and other companies are for articles generally. It is believed that in such an enterprise there is a fortune to the grower by bringing his produce directly to the door of the consumer at a reasonable charge. As it is said California will soon produce so much fruit that, unless we have the markets not only of the United States but of the great centers of Europe, there may be a glut in the fruit production of this State; but I am a firm believer that, as we have only reached about five millions of people with our fruit so far, we can reach the sixty millions of consumers in the United States, and they will take all the fruit that can be raised upon the Pacific Coast; in other words, I believe that the fruit consumption of the United States will keep pace with the fruit production. I know I have often said in relation to the prune industry, that, however great the production of the prune may be, it will be found that the consumption will keep pace with it, and that there never can be a glut of the fruit product of the State of California. Now comes the serious question, How transport the fruit to the consumer? The railroad, no doubt, would contract to carry any express fruit car through the East, and fruits could be sent from California as now, in trains, and distributed by the express fruit car system through the United States, and this would solve the difficulty, which would make us independent of the railroad and independent of the express companies as now organized in this country.

L. W. BUCK: No one would be more pleased to see these measures carried out, as these gentlemen think they might be, than I, and I presume that the railroad company would likely favor such a project, but if they favor it as they are figuring now, it would be because they would get a local rate from each point that the car stopped at. You cannot start a car at San José, running it through, and open that car at points between here and Sacramento to put in or take out freight, unless you pay the local rate from point to point. Whether that would or would not pertain to the railroads East, it certainly is carried out in this State to the letter. I, as manager of the California Fruit Union, have paid in many instances as high as \$100 for loading freight in one, two, or three places to be forwarded East; that is, in excess of the regular rates from the first starting point to the point of destination.

A. BLOCK: Mr. President, at the last meeting of this convention, held in Marysville, a resolution was passed appointing a committee to ask the railroad company for a reduction of rates. The committee went to work and an effort was made to get the reduction—a strong effort—and

something was promised, and when it came to headquarters the Southern Pacific Company said, "No, we cannot reduce; we will not reduce, but we will give you better time; we will give you five days between here and Chicago." The fruit growers accepted that with pleasure. Had they done it, when the convention met I should have introduced a resolution thanking them for that concession. We felt thankful; every newspaper in the State, and particularly those subsidized by them, lauded them, spoke favorably of them—how thankful we ought to be. How thankful we would be were their promises kept. For about four weeks, when there was but little shipping done, they very nearly kept that promise. They didn't ship in five days to Chicago, but they shipped in about six days from Sacramento, and that was a benefit to us. But when we commenced shipping from this town, within a week from that time they took from five and six days to ten, twelve, thirteen, fourteen, fifteen, and as many as eighteen days. These are simple facts. Now, Mr. President, we have quite a number of men here that live in San José, and take a great deal of interest in this section. How many of them are aware that the Southern Pacific Company receives our fruit from here to go on the train at Sacramento, and consumes thirty-two hours between these two points? At five o'clock I have my cars ready to leave San José to reach Sacramento, and leave there to-morrow at 12 o'clock at night, and that is thirty-one hours. At my solicitation, our friend Mr. Buck and Mr. Anderson went to see the officials of the railroad company at San Francisco. They were very much surprised. "It was all wrong and it would be corrected." That is what they said. Well, they didn't. Within a week after that time we got notice that we must have our cars ready an hour sooner, because they had got so much fruit to ship from here that they hadn't time to weigh it, and we must give them an hour extra; and then add ten to fourteen days more on the way, and my fruit was there rotting, for which they got full pay and I got nothing. Now, you are proposing to see what the railroad company will do. I have done a good deal of missionary work, and, like so many other poor missionaries, the railroad company got my flesh—cannibals get it in other cases. Now, I state facts, and I challenge contradiction.

MR. MASLIN: There is no doubt in the world that the railroad company did not fulfill their contract with the people, but something can be done; and as I look back upon the last fifteen years at the convocations of fruit men, I have seen a certain element who say it cannot be done. I was present when the fruit growers talked about the Fruit Union, and they said it could not be done, but such men as Mr. Buck and other energetic men like him, have pushed the Fruit Union on to a successful organization. We know how the majority of fruit men in this State said that the auction plan could not be carried on, and when we heard the figures, and the statistics, and the arguments, it seemed impossible that we could auction our fruit in New York or in Chicago; but it has been done, and it always will be done in that way, and it only wants certain intelligent men to get together to talk it over, and they will get a plan which can be carried out. Now, the very plan suggested to-day in reference to this organization, would take these companies out of the control of the railroad, and they would have the right of track and the management of its cars and its train to carry their own fruit to the places designated. I am not practically acquainted with the system; I am not

able to tell you how it can be done, but do not let us stand by and say that it cannot be done; let us try among ourselves to form some plan, negotiate with the railroad company, have a resolution passed and a committee appointed to get up a plan and submit it to the railroad people. I bring these things before you to call your attention to the facts that stare us in the face: that we will raise more fruit in the next five years than we can find a place to carry it to, and we cannot expect the railroad company to take care of it or to find distributing points for us.

MR. BUCK: Myself and quite a number of others went to San Diego last spring to meet the Transcontinental Association. We asked for certain favors: One was a schedule-time freight train, to haul our fruit. This they finally agreed to give us; they finally agreed to give us a time of one hundred and twenty hours from Sacramento to Chicago and equivalent points. As my friend, Mr. Block, has said, up to some time in July there were very few occasions that they did not give us about the promised time. After that, when shipments were heavier, according to their own admissions to me, they were unable to do it, and they failed in doing it, or anywhere near the five days' time. As Mr. Block has said, they ran up to even as high as fifteen days, and the general time they took during the heaviest shipments was from seven to ten days. I waited upon the railroad company, and urged on them the utmost necessity of better time, and they virtually admitted to me that they could not possibly do it this season; the number of cars of fruit had been so much in excess of what they received in other years, that they had not calculated for it, and could not make it. Now, what we want is to bring a pressure upon the railroad company to induce them to so fix their motive power that they can handle the trains of fruit from Sacramento, be they many or be they few. I believe that the railroad company can, and I hope that they will increase it, giving us the same service with heavy shipments that they did early in the past season with lighter. All of the early shipments of the season paid well, I don't care where they were from. I was in the East myself during June, and saw the fruit unloaded and sold in Philadelphia, New York, Boston, Chicago, Minneapolis, St. Paul, and Omaha, and almost without exception in fine condition—very few cars had a few lines off in condition, but generally fine.

F. A. KIMBALL: I would like to say in regard to the statement of Mr. Block. In conversation with Mr. Huntington during this time, he assured me that it was utterly impossible for the railroad company to carry out its agreement with the fruit growers; that there were not cars sufficient, as they could not be returned in time to comply with their contract, and I think he said that cars enough had been ordered for the future—for next season—to permit him entirely to carry out the time schedule agreed upon, and possibly to lessen that time. I further asked him in regard to the lowering of rates. He said it would be the policy of the company to give lower rates just as fast as circumstances would arise which would permit the company to lower them. I asked him how low it could ultimately be expected that the railroad company would come without coercion. He did not give me a direct answer. I told him I thought we would live to see the day when a carload of fruit would be carried into Chicago for \$50. He asked me my basis of reasoning, which I told him, and his answer was, "It was simply a question of the quantity of fruit that you will deliver."

MR. BERWICK: Get your Nicaragua Canal started; get two or three Government railways across, and there will be no dropsy in California fruit.

MR. BLOWERS: While East two years ago with "California on Wheels," I took the privilege of interviewing the fruit dealers on a little line running between Sioux City and Davenport, and found they would each of them take their pro rata of a carload each day, and that there would have been at that time no difficulty of disposing of one carload daily at those points on that little short line.

MR. COOPER: I would like to state to the convention that I have had a little experience in shipping, and found no difficulty whatever in having the car partly unloaded on the Missouri River and the balance carried on to its destination. The railroad companies between the Missouri River and any point East have granted that privilege. With regard to the rates of freight, they have increased from 10 to 15 per cent over what they were two or three years ago.

MR. KIMBALL: I am reminded that the rates have been reduced from \$1,250 down to \$165. I remember well the reduction of \$1,250 to \$1,000, and when Mr. Crocker laughed in my face, and said I never would live to see the day when a car of fruit would be carried across the continent for less than \$1,000; but I have lived to see them bidding for fruit in San Diego County at \$165.

MR. MASLIN moved that the Chair appoint a committee to consider the question of a larger and wider distribution of fruit on the plan laid down in an address of Mr. Mills, published in several papers.

Carried.

The President appointed on said committee E. W. Maslin, Leonard Coates, J. H. Flickinger, A. Block, and B. F. Walton.

Adjourned till to-morrow morning at 9 o'clock.

XIII.

TRANSACTIONS OF THE SECOND DAY.

WEDNESDAY, November 16, 1892.

Convention called to order at 9 o'clock A. M.

President COOPER in the chair.

REPORT OF COMMITTEE.

E. F. ADAMS presented the report of the committee appointed to consider the paper presented by A. L. Bancroft, on Fruit Marketing, as follows:

Mr. President and Gentlemen of the Convention:

Your committee to whom was referred the paper of A. L. Bancroft, relating to the formation of a State Dried Fruit Exchange, have had the same under consideration, and beg leave to report as follows: The thanks of the convention are due to Mr. Bancroft for the thought and labor which have resulted in the carefully detailed outline of the plan submitted, and while we find ourselves unable to entirely agree with him as to the method to be pursued, we do most cordially unite with him in saying that a State organization of the dried fruit interest should be formed, conducted by competent men, paid to attend to their duties.

The points upon which your committee are unable to agree with Mr. Bancroft are as follows:

First—The plan of Mr. Bancroft contemplates that each grower shall contract to place his entire product for the season at the disposal of the Exchange, to be sold when, and at such prices as the Exchange may determine, or find feasible. Your committee do not believe that any considerable number of growers can be found who will make such engagement. We know that large numbers are compelled to realize on their output very promptly, and would not be able to make such contract. The Exchange does not propose any definite plan for assisting such growers by advances, nor would any such action be possible while the growers retained control of their fruit; this the plan proposes that they should do, and, in fact, they would have to retain control of it, unless the Exchange should provide warehouses, for which there is to be no money. It might be best that growers should put the control of their product into the hands of the ablest and wisest among them, but we are sure they will not do it, and we cannot recommend an effort to attain the impossible.

Second—Mr. Bancroft's plan contemplates the shifting of the market places from the vicinity of the various terminal railroad points, where the products now change hands, and concentrating all transactions in San Francisco. Your committee believe that this would immediately cause powerful and bitter antagonism in every locality now enjoying this trade, in the face of which the Exchange would be entirely helpless. No locality will surrender any portion of its business without a fight. It is not proposed to remove the fruit itself to San Francisco, which, of course, would be foolish, as involving useless local freight and more expensive storage, and we believe that no power on earth can prevent the bulk of the transactions from taking place where the bulk of the fruit is; buyers will not buy by sample when they can see the fruit in bulk. If the concentration of this business at San Francisco had been commercially economical, it would have long since been established there. We shall have enough to do in securing the reforms which we desire without attempting to make unnecessary changes in the natural channels of trade.

In view of these conclusions which we have reached, and after further consideration which we have given the subject, your committee report that in their opinion the end sought by Mr. Bancroft can be much more certainly reached by local associations at the important shipping centers, coöperating through a central Exchange, with such powers and duties as the local Exchange, when organized, shall find it possible and expedient to commit to it.

In seeking to outline some definite plan for such associations to report for the consideration of the convention, the attention of your committee has been called to the work of the Santa Clara County Fruit Exchange, which was incorporated last June and is now actively engaged in preparing for the business of 1893.

The history of this organization is properly this: Some time in April or May of this year, some twenty or thirty representative men of this county united in a call for a con-

vention of all interested in the fruit industry to be held in this hall, to consider how far they could cooperate in marketing fruit. The resulting meeting was large and enthusiastic, and was followed by others, the outcome of which was the organization and incorporation of the Santa Clara County Fruit Exchange, with Col. Philo Hersey as President; Edward F. Adams, Vice-President and Manager; W. H. Wright, Secretary, with a Board of nine Directors, a majority of whom, by the by-laws, must have larger interests as growers than as driers or cannerymen. Growers, driers, and cannerymen alone are eligible as stockholders, and no one can own stock in excess of \$1,000.

This corporation is empowered, under its articles, to take the green fruit as it comes from the tree, and do everything needful to be done for it, until it reaches the consumer. The original expectation was that it should take the fruit green, when desired, dry, pack, and sell it in carload lots to any purchaser who appeared, charging for such services the actual expense thereof—interest on the necessary capital. The idea of drying, however, was soon abandoned, or at least postponed, as it was believed that this work could be more economically done by the cooperation of small growers securing drying-grounds and plant in the midst of their orchards, leaving to the Exchange only the duty of marketing and grading, and otherwise preparing for the market the dried product of those who desired it.

The capital required is the sum necessary to buy a lot, build and equip a warehouse, and a small working capital besides. For advances on fruit, which will be made if desired, it is deemed best to borrow as required, as it is not economical to raise capital, to be idle eight months, for the sake of using it four months.

The plan of operations, as it now exists in the minds of the Directors, consists of two entirely separate and distinct functions:

- I. A sales-room in the business center, rented for the season, in charge of a paid employé, open to buyers and sellers, whether stockholders or not, upon season tickets sold at a rate to cover expenses. In this room the Exchange will offer what fruit it has to sell, and all others, being ticket-holders, can meet there, buying from the Exchange or each other, in the manner common in other produce exchanges.

- II. A warehouse, with grading and boxing machinery, to prepare the fruit of small growers for the market. The business of the warehouse will be conducted on the plan of doing for each stockholder whatever he may deem profitable to have done by the Exchange and nothing more, the Directors believing that if they do the business wisely and profitably all will desire to share their advantages, while if they cannot so transact the business it is better that they should not be intrusted with it. They wish for no waste of material owned or the markets established by any of the stockholders, but rather to maintain all that has been thus gained, and supply the same or better advantages to the smaller grower.

The following have been suggested as the principal rules which will govern the business, and most of them are involved in resolutions passed at various times by the Directors, but they have never been actually adopted in due form, and on one or two points they touch matters not yet considered by the Directors, but they indicate quite closely the present opinion among them:

1. Separate charges shall be made for each class of service, to cover the possible cost thereof, including interest on paid-up capital and insurance, and any excess shall be returned to the proper person when the actual average cost shall be ascertained at the close of the season. All fruit received shall be charged with insurance.

2. In addition to insurance the following are the services which the Exchange shall perform and for which separate charges shall be made: Storing, grading, inspecting, dipping, boxing, selling.

3. Any stockholder may have any fruit inspected, with or without any one or more of the above services, as he may order. No service shall be given except upon the written order of the owner, and no service shall be charged unless actually ordered and rendered. No fruit shall be handled by the Exchange or sold under its brand unless inspected.

4. All prunes received, when graded, shall be binned together, and transferable warehouse receipts given therefor, less — per cent to cover shrinkage. When all receipts shall have been honored any excess shall be sold for account of the Exchange and the proceeds divided, pro rata, among the consignors. All other fruits, so far as possible, shall be treated in the same manner. Fruit insufficiently dried shall not be received for until in proper condition. Inferior fruit, at the option of the Exchange, shall be kept in original sacks and sold only by sample. Any fruit, at the owner's option, may be handled in the same manner, subject to charge for any additional expense.

5. Advances, when desired, shall be made by the Exchange on all fruit subject to its control, at current rates of interest, up to the limit of sound banking, and fruit so pledged may continue subject to sale by the Exchange, the owner, or any agent, at the owner's option.

6. The Exchange shall guarantee sellers under its inspection against all claims for rebate.

7. All sales by the Exchange shall be for spot cash f. o. b. San José. In case of complaint by non-resident buyers in regard to weight and quality the same shall be promptly arbitrated, and if sustained the rebate adjudged shall be promptly paid by the Exchange.

The above, as before stated, indicates about what is proposed. The plan of inspection and guaranty against rebate would require an inspector's fee to be sufficiently above the actual cost of inspection to cover insurance against occasional inevitable errors of inspector. It should be added that the plan of inspection has not yet been worked out, but it must be based on exact definitions of what the Exchange means by "standard,"

"extra," and other brands of the different fruits. The Directors have gone far enough with it to convince them that such definitions are possible.

It will be noted that the Exchange requires its brand to be placed on all packages. It is intended that the inspector's label shall be so attached to the package as to be destroyed in opening. The Exchange brand is not to be to the exclusion of private brands, which it is desired to have also appear on each package.

The expectation of success is based on the belief that wise and prudent management will secure it, and upon the plan of uniting growers, driers, and buyers in an effort to secure the utmost economy in all movements and manipulations of the fruit for the purpose of reducing cost. The Exchange expects to save some commissions, but not all.

The relations of such an Exchange to a State Exchange might be indicated by the following resolution, adopted by the Santa Clara Exchange, and which expresses the opinion of that body:

Resolved, That it be announced as the policy of the Exchange to induce the formation of Exchanges similar to our own in all prominent fruit districts of the State; and that when such Exchanges shall be formed, we will favor the formation of a State Association of Exchanges, the Directors of which shall be selected from the local directories, and whose functions shall be the gathering and distribution of information, the opening of new markets, the care of our exhibits at important industrial expositions, the detection and exposure of fraudulent practices calculated to injure honorable growers of and dealers in California fruits, and mutual conference in regard to prices."

This report is already too long to permit us to indicate what modifications of detail might be required to adapt the Santa Clara plan to other localities, where the leading products are different from those of the Santa Clara Valley. The plan as worked out is the result of careful study of nine competent men, five of whom are growers and four driers or canners, for the past six months. It seems to us the most promising attempt yet made in this direction, and as such we commend it to the consideration of this convention.

Respectfully submitted.

N. W. MOTHERAL.
G. M. GRAY.
ALEX. GORDON.
EDWARD F. ADAMS.

MR. MASLIN: I will state that I am not prepared wholly to agree with that report, and I hope it will elicit more discussion here, so that we may report back to the State Horticultural Society the result of this consideration. There are some things in the report that I do not think very logical. If we could have gotten together on a certain day, and said we must have a distributing point, why San Francisco would probably have been the distributing point; but as the fruit industry has grown by slow degrees, and very painful ones, too, and a few men in certain localities have been forced to dry fruit because they could not sell it green, it does not follow, therefore, that because San Francisco has not been the distributing point, that it is not necessarily the distributing point for the State of California. The report says that if we made San Francisco a distributing point it will create local antagonism. Who is going to antagonize the right of the dried fruit man to sell his fruit in what place and to whom he pleases? Is it the commission man in those localities? Does he stand as the arbiter of the fortunes of the dried fruit grower? If that is the case the dried fruit grower may just as well go to the commission man and tell him to put his price on the product; it may be so, in fact, but if it is so it is a yoke that every fruit grower in the State ought at once to get rid of, and how can you do it? We all agree that organization is necessary; we all agree that if men sell fruit at their own pleasure, the market is not secure, or safe, or permanent, and the object of such an organization as this, I don't care who denies it, is to fix the price of fruit. Call it a trust or by any other name, that is the object of the organization: that the fruit men may hold their fruit for such a period that they may demand and obtain the price they think is necessary for a living remuneration for their labor. Now, if we wait until each county in the State forms a local organization, we will wait till doomsday. We have been four or five years struggling on this question,

and up to this time one organization in Tulare County, of the raisin producers, and one organization in Santa Clara County, have been the outcome of all the pains, and penalties, and sufferings which the dried fruit men have endured. Now, if it is possible with these local organizations, using Mr. Adams' logic, why has it not been done before? Simply because there are not enough men in a locality to organize. They are afraid of the apparent struggle; they want some leading man to coalesce them, and here is the opportunity. Do not say it cannot be done; let it be tried at least for one or two years, and then we will create out of that central organization other local organizations, that will receive aid and support from the main organization.

COL. MCGILINCY, of Santa Clara: In this county we have at least two very successful coöperative drying establishments in which the growers are interested. Two years or more ago, the West Side Coöperative Fruit Drying Company was organized. It has gone through two business seasons successfully, and the managers have sold the product of that institution for more money than the owners could get themselves. Then there was another organized last spring, and while we have yet no reports from the business, we are satisfied that it will prove a success, and that by reason of this organization the growers will get more for their labor than if they had gone at it as they have been going heretofore—in a haphazard way. The best thing to do is to have the coöperative drier, and then they may send their representatives to a county exchange, and the product can be sold in that way. So far as experience goes in selling fruit by an exchange, I have none, but there are other lines of farm products that have been sold on exchanges with which I am thoroughly familiar. Let us organize at home; let us organize the growers in our midst; let us have the coöperative driers and then the exchange, and the problem will be solved.

COL. PHILO HERSEY: I am connected with one of these coöperative fruit drying associations in this locality, and a word in connection with the result of this year's transactions. We are a community of about seventy-five or eighty fruit growers, and got together and took from one to ten shares apiece at \$25 a share, and bought twenty acres of beautiful ground and the necessary buildings for the purpose of drying and curing fruit. We operated last year, and we think successfully. It is true that out of the seventy-five only about eighteen last year had a sufficient amount of trust in themselves to employ themselves and patronize the institution, but these eighteen (most of them officers, who could not go back on themselves—I, for one—and perhaps that is the reason) did patronize it; and at the time we hauled our fruit to that institution, we could get from \$25 to \$30 for the green prunes. We manipulated the fruit, sold it, paying interest on the investment at the rate of 8 per cent, and all the expenses, and divided on an average \$37 50 a ton—that for last year. There were peculiarities in this valley this year that no one could account for, results that no one could predict. We had a dry season and we had a small crop of fruit; the price of dried fruit was not settled, therefore no buyer knew what he could afford to pay for green fruit. This year, I believe, about thirty out of the seventy-five patronized the institution. We hauled 301 tons of green prunes there and had them dried, and out of that we have sold 153 tons of dried fruit. You will see it didn't take quite two pounds of green fruit to make one of dried; nobody, Mr. Chairman, knew what that result would be. If I

had known it, I would have made \$25,000 or \$30,000 this year instead of making nothing; but I didn't know it. Now, the farmer who joins with others and manipulates his fruit and gets it ready for the market, gets the benefit of such unknown things. You see, our crop was small; there was not sufficient moisture for us; the fruit ripened, but it did not fill up with water, and when thoroughly ripened instead of filling up with juice and water, it began to wither and to fall, therefore the result which I have stated.

MR. AIKEN: A very able divine, when called upon to offer a prayer before an organization that he knew very little of, thought it safe to say, "If there is anything good in this organization, O Lord bless it. If anything evil, curse it." That is about the prayer you should offer in reference to these local and State exchanges. We had some experience a few years ago with a dried fruit exchange, and after paying out the full face value of our stock, we were assessed one half more, and the exchange passed into history. I think our friend Colonel Hersey has delineated the plan of commencing down at bedrock—down where the people live—and working among the producers themselves, who, if they have confidence in themselves, can unite with the local organizations, and from the local organizations form State associations. In a conversation once with Mr. Towne, the manager of the railroad, he very wisely remarked that confidence moved the world; without confidence railroads could not be operated, the business of the United States could not be done. As we all know, there is only a circulating medium in the United States sufficient to do 5 per cent of the business; in other words, 95 per cent of the business of the United States is done on confidence, and not with money. I believe if the fruit growers of California can have confidence in themselves and in their neighbors they can build up the local associations. Confidence will move the fruit crop of the State of California to a lucrative and profitable market, however large the crop may become. There is no such thing as a glut of consumers of fruit living all over the United States and in European countries.

MR. MASLIN: When I was a boy in a debating society, I had a friend who always made one answer to any argument. He was a theological student, and said, "What does Paul say?" and that seemed to be an absolute answer to any proposition. Now, the question before this convention is the proposition to establish a fruit exchange, and I believe with the speaker who has expressed himself, that the question is in the same category with my college friend who says, "What does Paul say?" They have drawn three or four beautiful pictures of coöperative associations in local communities. Now I ask you, Do the people propose to erect a fruit-drying establishment in San Francisco? Did they ask you to bring the fruit to San Francisco and let us warehouse it? Not at all; the drying and preparing and processing of the fruit can be better accomplished by local organization; but when you come to sell the fruit, that is the point. Take an organization of say twenty counties; they stand as a unit of one man, and you will see that the fruit buyer will accede to the price fixed by that organization. Will you tell me that the fruit growers of Santa Clara County can fix the price for all the fruit of California, when down in Ventura the apricots are sold for \$15 a ton? You must have a coöperation of all the fruit growers in a common center, or you are left at the mercy of the broker and the fruit buyer, and your object is to overcome that very thing. Do Santa Clara fruit men

mean to say that when it is known that the fruit buyer can buy cheap apricots in Ventura, they can demand their price in Santa Clara? Fortunately, for one year they did it. A concatenation of circumstances enabled them to do it, but will they do it in the future? I believe that every State and every distributing point has succeeded best where they have controlled the markets of their provinces. It is so in Europe. You go to certain cities and you find a place there where all the producers and consumers meet. It is the world's fair, as Mr. Berwick has said in reference to counties. The producer and consumer, the middle man and the merchant, use a common center to adjust the business, and how can the fruit grower, separated and apart as he is, adjust the prices for his fruit when he does not know but that some other section is cutting his feet from under him? You need the practical experience in this thing. But why couldn't this fruit be sold by sample? Suppose you were in Ventura or San Joaquin, or any other county, and sent a sample of your fruit to a common center, where the manager is receiving his advices from everywhere and fixes the prices at which the sample can be sold. You have got the fruit product of California in your hands, and a lot of brokers running all over the State taking your feet from under you. It is so with the wine business. Is there a wine man in the audience who does not know that the weakness of the wine industry is because they are not organized? When a man goes to San Francisco to sell his wine, he goes to a wine merchant and is offered 10 cents. He goes to another merchant. But the telephone runs between the offices, and he completes the circle and is only offered 8 cents. So it will be in a larger degree with the fruit produced in this State.

MR. ADAMS: Upon the proposition of a State exchange based upon the theory of local exchanges, we are unanimously with you, but upon the proposition to establish a State exchange—not a representative body, but an original body composed of individual bodies all over the State—we do not agree with you; and the proposition that ought to be discussed as between our report and the paper of Mr. Bancroft, is whether a State exchange based upon local exchanges is the way to operate.

An adjournment was taken till Thursday morning.

XIV.

TRANSACTIONS OF THE THIRD DAY.

THURSDAY, November 17, 1892.

The convention was called to order at 9 o'clock A. M.
President COOPER in the chair.

FUNGOID DISEASES OF THE GRAPE.

COULURE,

OR THE DISEASE RECOGNIZED BY THE DROPPING OF THE YOUNG AND UNDEVELOPED
GRAPES IN THE EARLY SPRING.

Essay by N. W. MOTHERAL, of Hanford.

Mr. Eisen, in his work "The Raisin Industry," in an article styled "Powdery Mildew, or Uncinula," uses the following language:

"The mildew appears at two different stages: one in the spring, when the vines are in blossom; the other again later in the summer, when the fruit is more advanced. The first stage of the mildew resembles a fine cobweb spun between the flowers of the bunch. If allowed unrestricted sway, the flowers will drop off, the fruit will never set, or set only imperfectly, and the crop will be a great loss or even a total failure. Generally the inexperienced vineyardist does not perceive the mildew until too late. A slight touch to the vine will then bring down all the young fruit or blossoms like a shower, and the stem of the bunch will be seen to be entirely bare, or with only a few scattered berries. This form of the Uncinula mildew has not been as scientifically investigated as would be desirable, and nothing is known as regards its development. It is possibly a primary generation and early stage of the later Uncinula. I believe this form of the mildew is identical with the disease which is called coulure by the French, and which is characterized by the dropping of the young, undeveloped grapes. The first appearance of this mildew is always accompanied by white, salty excrescences on the edges of the grape leaves. Whether they are directly or indirectly connected with the fungus is not known."

This unsatisfactory description of coulure is perhaps as good and clear as any we have in the literature on the subject. Three years ago, while acting as Special Agent for the State Board of Horticulture, I was lead to doubt the correctness of Mr. Eisen's statement, that coulure is an early stage of powdery mildew, and commenced experimenting with a microscope, and soon discovered that coulure is not a fungus, but a salt. I also discovered that it originated from the sap and is held in solution, and when the water was evaporated upon the surface of the leaf the salt was left behind. I also discovered that the delicate stems, flowers, and young berries were covered with the same salt, and that the dews at night would dissolve this thin stratum of salt, which covers every part of the growing plant (where evaporation has been going on),

and that gravity would take the fluid to the lowest point of the leaf or stem, and that the sun the next day would evaporate the water and leave a white ring around the margin of the leaf, thus accounting for the statement made by Mr. Eisen, that the first appearance of this mildew "is accompanied by white salty excrescences on the edges of the grape leaves." I also discovered that this salt was corrosive, and burned the surface of the leaf and destroyed the flowers and young berries. Thus the theory was exploded in my mind that coulure was the first form of powdery mildew.

The spider-web appearance alluded to by Mr. Eisen is indeed the web of a gossamer spider. There is also connected with every growing grapevine a substance resembling somewhat a spider web, but more accurately resembling spun glass, which deceived Mr. Eisen, and perhaps others who have attempted to investigate this subject with a microscope. This substance is seen upon all healthy vines as well as diseased ones.

Remedy.—The foundation of the difficulty is in the soil or climate. If the salts were not in the soil they would not be in the sap; if the nights were not so much colder than the days there would be no suspension of circulation, and there would be no chemical change in salts contained in the sap.

I learn from parties from the vine district in France that this disease, years ago, when the vines were first planted, was very destructive, but now it has almost disappeared, because the salt producing the trouble has been exhausted from the soil. The remedies we have been using, to wit: sulphur in any of its compounds, is utterly useless, and is an expenditure of money without any profit. Many farmers in Fresno and Tulare Counties have discovered this by experiment. The Tulare County grape growers, under the advice of its County Board of Horticultural Commission, have decided not to use sulphur in the early spring. Mildew is a disease almost unknown in the open fields in the county, and is only observed upon vines that are trained upon trellis-work about the houses.

MISCELLANEOUS ENTOMOLOGICAL NOTES.

By PROF. C. W. WOODWORTH, of Berkeley.

Many questions that are of considerable general interest are continually arising in the correspondence of the Department of Entomology at the University, and I take advantage of this occasion to present a few of those most commonly recurring, believing that by so doing I will not be repeating facts known to all.

First, in regard to the arsenites there have been many questions. There are three substances of this class sometimes used: Paris green, which is an arsenite of copper, and is insoluble or nearly so; London purple, which is an impure arsenite of lime, containing much aniline and sometimes some white arsenic, and is sometimes for this reason slightly soluble; and finally, white arsenic, also called arsenious acid—a combination of arsenic and oxygen. White arsenic is quite soluble, especially in hot water. All the arsenites are more or less injurious to the growing parts of plants, and it seems that the more soluble it is the more injurious it becomes. For this reason Paris green is generally the safest. It is also the most expensive, and it appears to me that a home-made

arsenite of lime would be the cheapest and most satisfactory insecticide. In mixing arsenites with other washes we should remember that both acids and alkalies make the arsenites more soluble. The same is true in regard to soapy washes, which act in this respect like simple alkalies. Lime acts in the other way, making them less soluble. White arsenic makes a very valuable addition to an alkaline wash, but must be used in very small quantities.

The method of spraying with arsenites should be very different from that employed for washes against the scale insects. The stream must not be forced against the leaves, but be applied like a gentle mist. This can generally be best accomplished by standing as far from the plant as the stream will carry. The application should be made very evenly all over the plant, and no more used than barely enough to make the leaves begin to drip. The same is true in regard to spraying for almost all insects besides the scale insects, and also for fungi. The pressure used for spraying for scale insects in this State is much greater than is usually employed, and the nozzles are often coarser; but whether this is a loss or an advantage is a matter not well established. I expect to be able to speak more definitely on this point after the apparatus for testing pumps and nozzles, which is being constructed for the University, is completed. At any rate, it may be said that low-pressure pumps and fine nozzles are very satisfactory. The proper relation in size between the pump and nozzle is another matter we will be able to discover by the use of the new apparatus.

Another subject which was the burden of a great number of letters was what was to be done in the case of unknown or doubtful plant diseases. These were sometimes fungoidal and often complications of a number of troubles, but a large number were those whose causes were entirely unknown to science or of a highly problematical nature. Indeed, of these unknown diseases this State is peculiarly well supplied. Generally it is best to treat a doubtful disease as a fungoidal disease; that is, spray it with fungicides. Of these, the best to try, perhaps, is the Bordeaux mixture or the ammoniacal copper carbonate. Another good thing to do is to destroy by burning, if possible, the diseased parts or plants. Do not replant on the same ground.

Finally, I wish to speak of a little insect known as the thrip. There are two classes of insects which commonly receive this name. The false thrip of the grape and other plants is a leaf hopper of the family *Jassidæ*. We have tried a good many remedies for this insect, with no success; that is, remedies that are practical in the field. Among others we tried the lantern traps, which have been recommended, and they were the most dismal failure of all the remedies tried, as I could not find that I had killed any of the insects in question, even surrounded by vines swarming with them. The true thrip is a smaller insect and belongs to the *Thripidæ*. I learn that they have long been observed in the State, doing a good deal of injury, but their nature does not seem to have been recognized, for I have been so far unable to find any published account of their work. Their work has probably been confounded with that of the red spider, which they very much resemble. There is no web made by these insects, which will enable one to readily distinguish them from the red spider. The past season they were very bad on pear, prune, and almond in some parts of the State. I was unable to try any remedies. They should be looked for next season.

FOREIGN PESTS AND DISEASES.

By ALEXANDER CRAW, Quarantine Officer and Entomologist of the State Board of Horticulture.

Threats have been made by the Association of Eastern Nurserymen, that unless the quarantine laws of California were repealed, or the regulations thereunder were relaxed, they will institute a boycott against California fruit and inaugurate other measures to injure the fruit industry of this State. These threats are made because, in self protection, and for the protection of the greatest industry of the State, the State Board of Horticulture has refused to admit trees infested with contagious diseases or pests, and more especially trees grown in districts known to be infected with peach yellows and peach rosette.

There is nothing in our laws or quarantine regulations prohibiting the introduction of healthy stock from any State in the Union or any part of the world. The Eastern nurserymen—or the portion of them represented by the association—seem to labor under the mistaken idea that our laws are in some way aimed at them; that they have been passed and enforced for the purpose of injuring them in their business. It is not necessary to state here how unfounded this impression is. We are not devoting our time and labor to their injury, but to our own protection. It matters not to us where trees are grown. If they are healthy they will find a welcome, but if they are infested with pests or diseases which threaten our very life, they will be destroyed, even though it were possible for the Eastern Nurserymen's Association to carry their threats into extreme execution. We had better have clean fruit for local consumption, and no markets whatever, than the whole world for a market with no fruit to supply it. We have no fight with Eastern nurserymen, and want none; whatever they may threaten or do we have no desire to retaliate, for such action is childish; but whatever comes we will obey the first great law of nature—self-preservation.

During the past season thousands of trees have been quarantined and destroyed, because they were discovered to be seriously infected with dangerous insect pests. These were imported not from the Eastern States alone, but from many parts of the world. There were other thousands of trees and plants from the East and elsewhere, which examination showed to be clean, and these were passed without trouble. I allude to this to show that our laws and regulations are neither prohibitory nor vindictive, and are not passed with a view to injuring any one.

The fruit growers of California have had some very expensive experience with imported pests and diseases. I might instance the cottony cushion scale, which so nearly destroyed one of the most important branches of horticulture in our State, and lost the State and people millions of dollars, in loss of crops, loss of orchards, and expense of fighting. This is but one instance out of many, and so far from relaxing our protective measures, I should rather advocate the tightening of them. We know that numerous destructive pests exist in other parts of the world, and we know too well, from sad experience, what their introduction here means. We have no desire to experiment with them, and are in nowise anxious to discover the amount of poison they can consume, the quantity of "bug juice" they can imbibe and live, or the volume of gas they can inhale and still retain their destructive and reproductive powers.

In my early experience in horticulture in California, I remember the fruit trees were comparatively clean; no damage had then been done by insect pests, at least to any appreciable extent, and "our glorious climate," in which everything else under the sun would thrive, was credited with being an unhealthy thing for bugs. We had then so much faith in our climate that we really believed it to be a sort of patent reversible arrangement, that was good for what we wanted it good for, and bad where we wanted it bad. But, alas! it did not prove so. At that period no one had suffered financial loss from this source, and firmly believing that in our great State there was room enough for all, we let these little insignificant bugs go on reproducing themselves as rapidly as they saw fit, and had no thought of molesting the little fellows. But it soon dawned upon our understanding that they were bigger than we, and worked while we slept, or at least they outnumbered us so vastly that bulk could not hold against numbers, and we became convinced that either the orchard or the bug had to go. It was painful and costly experience that impressed this knowledge upon us, and we were forced into the fight. At a vast expenditure of money and labor, to say nothing of patience and temper, we are in a fair way to become masters of the situation, and we cannot afford, out of esteem for our brother nurserymen in the East, to abandon the fight on the verge of victory, and allow them to undo all that we have struggled so hard to accomplish.

The charge made by our Eastern friends that we have been influenced in our action by mercenary motives, and that the sole object of our quarantine laws has been to promote the business of our local tree dealers at the expense of the Eastern nurserymen, is too puerile for notice here. The California nurserymen themselves objected to the quarantine law as interfering with their business, and as most of our nurserymen are to some extent importers, if any hardship was worked by it they, more than the Eastern people, suffered. But the passage of protective measures was demanded by the fruit growers of the State as the only salvation of their business, and the tree growers soon saw the justice of the measure and conformed to its requirements.

There was a class, however, to whom it worked a hardship. This was composed of unscrupulous real estate dealers, who would purchase cheap land, get the cheapest stock they could find in the country, without regard to its condition or the safety of adjoining orchards, set this out upon their land, get it started, and then sell the "orchard" at a low price, but with a big profit to themselves.

As showing that there is still occasion for us to be on the alert, and take every precaution to prevent the introduction of new pests and diseases, I will mention a few that are very serious, that do not now exist in California, but which are liable to be introduced upon trees or plants.

The first of these, as the most threatening danger, are the peach yellows and the peach rosette. Wherever these diseases have been introduced they have spread with rapidity and fatal effect. When a peach tree is once affected death is as sure as it is in the case of a man attacked by leprosy. The only remedy is to uproot the affected tree and destroy it; no other known treatment is successful. Interested parties have asserted that because the disease has not yet obtained a foothold here it cannot exist here; that there is some mysterious quality in our climate that is detrimental to these destructive peach diseases. We used to think so about bugs, but when the bugs came all that the glori-

ous climate of California did for them was to furnish superior opportunities for their increase. We cannot afford to make the experiment with the yellows or rosette. I have been informed by Mr. Stratton, of Petaluma, that in 1855 there was a well-developed case of "peach yellows" in Father Taylor's orchard, in the town of Alameda. It was introduced from the East upon two "Morris White" peach trees and spread to the adjoining trees. It was recognized and pronounced a genuine case by the foreman of Frost's Nursery, of Rochester, N. Y., and he advised the destruction of the trees in that neighborhood. This was done, so the vigorous measures saved the peach orchards of the State.

The peach rosette is of more recent origin than the yellows, but not less fatal. It resembles the yellows in that it can be transmitted to healthy trees by budding, and a single bud from a tree affected with either disease put into a healthy tree will cause its inevitable death in about two years. It is an absolute impossibility to detect the germs of either disease, and not until its deadly work has made itself manifest can it be known that the disease is present. The germs of either or both of these fatal diseases may be present in imported stock, and no knowledge could be had of it in the young stock. The only safeguard against its introduction into our healthy orchards, therefore, lies in the absolute prohibition of the importation of trees from the infected sections.

Another pest which we do not have and do not want is the plum curculio. Let it once gain a foothold in our State and the profits of the growers of prunes, apricots, and cherries would be materially reduced, if indeed they might not be reckoned in ciphers. The newspapers would not then be filled with glowing accounts of the enormous profits which Mr. Brown made from prunes, Mr. Jones from apricots, or Mr. Robinson from cherries, for the little bug once at work would toil with tireless industry to place the figures on the loss side of the ledger. And he would come very near accomplishing it, too. We have no use for this industrious little individual in our State, and no curiosity to find out even whether our climate will agree with him. And to keep him out of employment here all trees arriving from the East must be carefully examined and all soil attached to the roots, together with the packing in which the trees arrive, be removed and burned. This process will effectually destroy any of the beetles that may possibly be concealed.

The black aphid is a new peach pest that has made its appearance in several of the Eastern States, and has proven as destructive as the yellows. It attacks the roots of peach trees very much as the woolly aphid does those of the apple tree, but is infinitely more destructive. Records are made of nurseries of 100,000 trees, in the Eastern States, being killed outright within three weeks after they were attacked. California had a very narrow escape from this pest last winter. A large shipment of peach trees was imported into Santa Clara Valley from the Eastern States, which was found to be infested with this pest. The entire shipment was destroyed and the danger averted. The black aphid differs from the common peach aphid (*Myzus persicæ*) in being jet black in color, with a shiny body, of vastly greater fertility, and the fact that it breeds upon the roots as well as upon the leaves and branches. Prunes budded on peach stock would be liable to attack equally with peach.

Another pest infesting Eastern peach stock are root-borers, but of this family we have a native species, which in some parts of the State is very troublesome.

Trees imported from Florida have generally been found to be infested with purple, long, Florida red, chaff, and wax scales, and have to be subjected to fumigation before they can be passed. During the past season inspectors have found small colonies of these scales upon trees which arrived three years ago, and were planted without being disinfected. These trees were subsequently treated and the insects destroyed.

To be forewarned is to be forearmed, and for the benefit of the members of this convention and the fruit growers of the State, I present here a list of some of the more destructive pests which we have not yet got in California, and against the importation of which we must be upon our guard:

The curved-wing apple moth (*Erechthias mystacinella*) is an Australian insect, which in its young or larval state burrows into apple trees, generally around the warty excrescences caused by the woolly aphid. They gnaw into and tunnel the wood of the tree in such a manner that air and moisture are admitted, and the tree becomes weakened, and breaks down. There are three or four broods in Australia each year. The larvæ or borers are about half an inch in length, and of a pale greenish color. The moth has a spread of half an inch. But it is the borer that we have to look for in imported trees. This pest is known to attack other trees, especially the acacia family, so it is well to keep a close watch for it.

In Australia and Tasmania is found another apple-boring pest. It is a small beetle that burrows into the trunk and large limbs of apple trees. The full-grown beetle is about one quarter of an inch in length; it has a curious curved thorax, with the head turned under. When numerous, they cause the tree to wither and die. They can be detected by the openings of their burrows. Trees infested with either of these borers should be destroyed immediately upon their arrival.

The roots of trees, especially apple and other fruit trees, have to be carefully examined, as in Australia they have two species of curculio, the young of which cut long furrows in the roots. Unlike other borers, this species is exposed and works in the bark and sapwood, and as that is really the vital part of the plant, the tree soon withers and dies. The grub of this beetle, when full grown is nearly one inch in length, and three sixteenths of an inch in diameter. It will thus be seen that it is capable of doing considerable mischief. The borer is yellowish-white and the perfect beetle is grayish-brown.

Another serious pest, and a more general feeder, that has to be guarded against, is the *Marago gigantella*. The larvæ of this moth burrow into cherry, peach, apricot, and plum trees. When full grown they measure nearly two inches in length and are pinkish-white with a dark head. Of course, in their primary stages these borers are very difficult to detect, and the inspection of all imported stock should be very thorough.

A fig leaf beetle (*Galerucella semipullata*) occurs in great numbers upon the wild and cultivated figs of Australia. The perfect insect feeds upon the bark and the larvæ upon the leaves and buds. The beetle measures a little over a quarter of an inch in length and is dull reddish-brown and covered with fine silky gray down; the head and thorax have each a large brown spot. The eggs are laid in patches of from fifty to one hundred and twenty; they are pale yellow and attached to the leaf or stem, and as the female prefers to deposit them upon the young fig trees it will be seen that we run great risk in introducing fig trees from

the antipodes. Any soil adhering to the roots should be removed and thrown into a fire, to destroy any pupæ or beetles that may be hibernating therein. As fig trees in California are exempt from the attacks of insects, great care must be taken to see that this pest is not introduced.

Trees of the pine family should be carefully examined, for in Australia there is a serious pest in the form of a moth upon *Pinus insignis*. The larva is brownish-black, with the head and thoracic segments dusky white and irregularly mottled with small brownish spots. When the larvæ are full grown they measure about one inch and a half in length, and are protected by pieces of pine leaves held together by silken webs spun by the larvæ. In the pupa stage they suspend the mass of web and leaves by silken threads to a branch, and after a time change to the adult stage. The male of this moth is winged, but the female is wingless and legless, so remains within the pupa case and deposits her eggs at the opening thereof, where the young hatch and spread to the other leaves.

Australia and New Zealand have probably a greater number of species of scale insects than any other portion of the world. An examination of the contents of the cases upon exhibition will show a number that have been found upon imported trees and plants. The cottony cushion scale and the destructive red scale of the orange were introduced upon trees from Australia. When established in California, where we had no natural enemies to keep them in check, they increased to such an extent that hundreds of thousands of dollars were spent in the warfare against them. This expenditure of money was a positive necessity, in order to keep the trees alive, for in one to two years the orchards were in such a condition that they were practically worthless. Finally, the natural enemy of the cottony cushion scale was introduced and the devastator was laid low. Other ladybirds and predaceous insects have been collected by Mr. Koebele in Australia, and have been colonized in different portions of the State, and we look for good results from them upon the red and black scales. This system of fighting injurious pests with other insects is the proper course to pursue, and every assistance and encouragement should be given it.

BENEFICIAL INSECTS.

The President announced that the report of Albert Koebele, who was detailed (by the Department of Agriculture, through an arrangement with the State Board of Horticulture) to go to Australia and adjacent countries for the purpose of importing parasites and predaceous insects, would be read, for the information of the convention. As said report was a report to the State Board of Horticulture, it would appear soon in a special bulletin, and afterwards inserted in the proceedings.

NEW SPECIES INTRODUCED.

To Hon. ELLWOOD COOPER, President, and to the honorable State Board of Horticulture:

SIR: At your request I give herewith some notes of the condition of fruit trees and the coccids injurious thereto in Australia, also the work of natural parasites upon the same in that country, as found during my recent mission; at the same time giving you a statement as to how I

found the recently introduced species on my trip to Los Angeles and Santa Barbara at the beginning of September, 1892, and my opinion of their future work in this country.

My report upon this last trip has been forwarded to the Secretary of Agriculture, to whom I had to report as directed in letter of authorization, dated May 29, 1891. In it I give a full account of all the beneficial insects found and forwarded to this country, as also of such as were studied in the field, and which may be introduced at some future time. As this report will not appear in print until some time during 1893, I will briefly acquaint you with what was accomplished.

As you are aware, my chief work was to search for such parasitic and predaceous insects as prey upon the coccids injurious to our fruit trees. These are the so-called red scale (*Aspidiotus aurantii*, Mask.), detrimental to our orange trees; the pernicious scale (*Aspidiotus perniciosus*, Comst.), upon and destructive to various deciduous trees; and the various black scales (*Lecaniums*), as the principal species.

The red scale is present all over Australia upon citrus and various other trees and shrubs, and has been known upon orange trees for the last fifty years. Whether the insect is a native or introduced cannot be said with any certainty, but as the conditions indicate, I think it is an introduced species. Internal parasites could rarely be found upon the same; chiefly upon the male scales, small holes were occasionally found, from whence minute chalcid flies had issued. None of these were bred.

The black scales are represented by various species, and our most common forms, *Lecanium oleæ*, Bernard, and *L. hesperidum*, Linn., are found everywhere in New Zealand and Australia, and in my opinion are indigenous to the latter country. Numerous internal parasites were found preying upon these two coccids, and were repeatedly sent here. It is in predaceous insects feeding upon the various coccids that Australia is immensely rich, and these are chiefly ladybirds (*Coccinellidæ*).

The group *Orcus* resembles our own form *Chilocorus*, of which *C. bivulnerus* is well known in California. The habits are the same; they will breed upon a variety of scales from early spring until winter, when the mature insects will hibernate for a time. Four species of these were sent here, and two of them, *O. chalybeus* and *O. australasia*, in very large numbers. *Cryptolæmus* was found in two forms, *C. Montrouzieri* and *C. australis*. The larvæ of these are peculiar, as they are covered above with contiguous, white, mealy, secreted appendages; they feed chiefly upon mealy bugs (*Dactylopius*). The first named species, which was sent here in large numbers, is also doing good work in feeding upon the various black scales.

Bucolus is closely related to *Cryptolæmus*, and two forms were sent here. Probably the most valuable of all the scale-feeding *Coccinellidæ* are the *Rhizobiids*. This group is very largely represented in Australia, and only a few forms are reported from other parts of the world. America had none previous to this importation. The insects are closely related to our *Scymnids*, but some of the species are much larger. They feed upon all sorts of scales, and their larvæ were found at all times during the year in Australia. Some fifteen species, nearly all unknown to science, were sent here.

Scymnodes also resembles *Rhizobius*; but one species, *S. Koebelei*, Blackburn, and a variety of the same, named *varipes*, were sent here. These are expected to feed upon black scales and *Chionaspids*. *Erithionyx* is

quite a large black beetle, covered with short, yellowish-brown hairs; the one species, *E. lanosus*, was found feeding on *Chionaspis*, upon orange trees infested with black scale, and was repeatedly sent here. These species were liberated by you upon *Lecanium*.

Scymnus is known to almost every one; we know the value of our *S. marginicollis* in California, and the good work it is able to do upon a variety of scales. I have so far eight species named from Australia and a number from New Zealand, which were sent here. These can be expected to feed upon most of our coccids.

Mydus resembles a *Scymnid*, and *M. pygmaeus*, feeding upon mealy bugs, was sent here; and there are a number of groups of small, roundish *Coccinellidæ*, of which *Gynoscyrnus*, *Cycloscyrnus*, *Libernes*, *Cyreme*, and *Serangium*, found upon a variety of coccids, were sent here.

As to the aphid-feeding *Coccinellidæ*, all the species that could be obtained were collected and forwarded. Some of these will not only feed upon plant-lice, but will also live upon scale insects. *Coccinella antipodum* has only been found by me to prey upon scales in New Zealand. *Coccinella arcuata* was found in southern Queensland feeding upon the orange aphid, but on the Richmond River, New South Wales, the same insect was feeding upon *Lecanium filicum* on a fern, and again at Levuca, Fiji, it was feeding upon an *Aleurodes* on taro leaves. *Leis conformis*, which feeds on plant-lice, will, after these have all disappeared, begin its destructive work upon the woolly aphid, of which it cleans whole orchards, as observed in South Australia and Victoria.

In all, some forty thousand specimens of ladybirds were collected by me during this last trip, and forwarded to California, and I can say positively that no mistake was made in sending anything but beneficial insects.

It was timely discovered that nearly all the larvæ of the ladybirds in Australia are preyed upon by parasites, in certain instances almost destroying all of these. The pupæ are also preyed upon by chalcid parasites, and in consequence only the mature insects were sent, thus leaving all their enemies behind, and we shall thereby have the benefit of the work of these insects without the detriment of the parasites preying upon them.

One of the best enemies to the black scale in Australia is the larva of a small moth (*Thalpochares*), which builds itself a house, so to speak, by spinning together the remains of the eaten-out scales, etc. With this protection against its enemies, it is able to walk over the tree, and thus devours large numbers of the scales daily. The transformations of this insect have not been closely studied in the field, but from what I have seen must be very rapid, especially in warm weather; and as full-grown larvæ were found upon the same tree about every two weeks, it will take at the most four weeks from egg to mature insect during summer. When full grown the larva spins most anywhere on the tree, but prefers any crevice on branches or trunk of tree, between the forks, and also on the ground at the base of stem. According to the season or circumstances, they may pupate at once or remain for several months, and in no case should they be disturbed in any way, for if taken out of their cocoon they will rarely be able to spin another and will invariably perish. Two species were found in Australia, and one at least is introduced and established.

The trunks and branches of citrus trees in Australia are often covered

with fine, silky webs interwoven with remains of scales, and under this are found numerous larvæ of a small *Tineid* moth that devour the coccids thereon. These latter are chiefly *Chionaspis citri* and *Mytilaspis Gloverii*. Efforts are now being made to introduce this valuable little moth here, and a number were liberated upon trees infested with the pernicious scale.

Aside from the numerous parasites and predaceous insects destructive to scale insects in Australia, there exist several species of fungoids detrimental to various coccids. *Microcera coccophilla*, if once started upon a tree infested with the red scale, will keep on spreading until all the scales are destroyed. The same may be said of the fungi living at the expense of the black scales. I have had a number of small orange trees infested with *Lecanium*, on which also were ants that kept away the natural enemies—upon which the *Thalpochares* larvæ were collected regularly, as these, with their protecting armor, are quite safe here—on some of which the fungus began to spread until every black scale upon the trees was destroyed. The fungus will apparently only grow during damp weather, and I shall try it in the early spring. If once started this could easily be disseminated.

The condition of the olive tree, as observed in South Australia, is fairly good. Some of these are more or less infested with black scale (*Lecanium cassiniæ*, Mask.), but notwithstanding this, trees seen on a hillside, growing wild, so to speak, were loaded with fruit, and but few of the trees had scales in quantity. It was a time when everything was completely dry that I visited South Australia, and the predaceous insects found feeding upon these scales may not be all that prey upon them at other times of the year. The species found in larva, pupa, and imago state upon olive were *Rhizobius hirtellus*, *R. cæcus*, and *Cyreme nigellum*. The first-named species was present in very large numbers, and was found upon various scales in New South Wales, as also other coccids. Both the larvæ and pupæ of the *Rhizobiids* were found destroyed in large numbers by parasites.

In New South Wales, where my work kept me during the time among the orange trees chiefly, the species of *Coccinellids* found preying upon *Lecanium* were far more numerous. I will mention but a few, which are always present in large numbers with the black scales. These are: *Orcus australasia*, *Rhizobius ventralis*, *R. hirtellus*, *Cryptolæmus Montrouzieri*, and the larva of the *Thalpochares* moth, which alone is able to free whole trees in a very short time. It is only upon bushes or young trees generally covered with large numbers of ants, which prevent the predaceous insects from coming near, that the black scales become numerous. Upon old trees these coccids are but rarely found in numbers, and if so, only upon an occasional branch, which is speedily cleaned again by the numerous predaceous insects preying upon them.

The red scale (*Aspidiotus aurantii*) is, perhaps, aside from *Mytilaspis Gloverii* and *Chionaspis citri*, the most numerous coccid upon citrus trees in Australia, and in fact is at present the most injurious to citrus trees in that country; but its progress is checked by its natural enemies. Australia is in possession of more than enough natural enemies to keep this coccid in check with ease, although nearly all these are preyed upon by parasites. To spray or fumigate to kill the red scale would also mean the destruction of the numerous beneficial insects, and those that were not killed outright would mostly leave the orchard in search of other

food, and the consequence would be that in a few months the trees would again become infested, with but few enemies present, and the scales would do great damage unless "the spray is again applied."

As it is, at the present time in Australia, orange and lemon trees are often planted in almost any locality, without regard to the situation, condition of soil, drainage, climate, and other conditions. The consequence is that some of these orchards become diseased, presumably from the effects of the red scale, and, as is the case in the Gorden district, near Sydney, one tree after another will succumb. An examination showed that these trees had been planted in heavy, clayey soil, without any drainage, and were invariably destroyed by the so-called "foot-rot." The fact is, that if an orange or lemon orchard, as the case may be, is left for years without any attention whatever, the weeds allowed to grow, and planted in an unsuitable location or soil, before very long the leaves become yellow and drop off slowly, and in time the remaining green leaves become covered with red scales, since, as is always the case, the predaceous insects preying upon this scale will not be found on such trees, as they prefer those with dense foliage and shade. Such trees may thus linger for months, or even years, before dying, and may even again recover if proper attention is given them. In one of such orchards, of several acres in extent, but a few living twigs covered with red scale were found, yet not a single one of the many predaceous insects preying upon them could be noticed. In another instance, an orchard of some eight or ten acres and about thirty-five years old, the proprietor of which always supplied sufficient manure and kept the ground cultivated, during the whole time of its existence had been infested with red as well as other scales, and yet but a very few trees along the border of one side could be found that showed any traces of such. The whole orchard during the thirty-five years had never been pruned or sprayed, nor even had the trunks ever been washed. Numerous dead limbs were present, the stems and limbs partly covered with lichens, and yet I did not meet with a finer lot of trees in Australia—such glossy, deep-green foliage, abundance of fruit, and so free from scale.

A large number of predaceous insects were found preying upon the red scale in Australia. Of the most numerous were *Orcus chalybeus*, *Orcus australasia*, and *Rhizobius satellus*. Aside from these, numerous other species of *Rhizobiids* were found preying upon this scale, and many species of *Scymnids*, all of which were sent here. In my report all of these are treated separately.

On my visit to Los Angeles and Santa Barbara in the beginning of September, *Orcus chalybeus* were found at Los Angeles, where this species was liberated upon the red scale, in such numbers that we can reasonably hope they will have increased by next April, so that we may distribute them throughout many orchards.

The condition in which the insects liberated by you upon the olive scale were found was even better than I had expected. The species present were *Orcus chalybeus*, *O. australasia*, *Rhizobius ventralis*, and *R. debilis*. Without doubt other species sent to and liberated by you will appear in large numbers next spring. It is impossible to find, within a couple of hours' search, all the species present in a large orchard. *Orcus australasia* and *Rhizobius debilis* are feeding upon the pernicious scale (*Aspidiotus perniciosus*) at Alameda, where they were liberated by Mr. Craw, who at the same time left a number of *O. chalybeus* upon these

coccids; but these have all disappeared, though, positively, not to die. They will be found upon *Lecanium* or *Chionaspis* in time. I have never found this insect feeding upon *Lecanium* in Australia, and did not expect it would feed upon *L. oleæ* with you; but this will only show that a coccid-feeding ladybird, if at liberty, will most always find its food for future generations, and no doubt most of the species liberated here will be found again in numbers upon some scale.

In regard to the two species of *Orcus* we now possess, they were found, if my observations in the field are correct, to be two-brooded in Australia, the mature insects hibernating during winter. The *Rhizobius* are much faster in breeding, and I estimate about six broods per year. The larvæ of these, although not numerous at the time, were found in midwinter.

These insects here, with but few enemies, should increase about fifty-fold with each brood, and from one female of *Orcus* we should expect about 2,500 beetles at the end of the season, under favorable circumstances; while of *Rhizobius*, with six broods, upwards of 15,000,000,000 beetles could be expected, and these figures will not be much out of the way in your orchard, where there is an unlimited supply of food.

On a day when the temperature reached above 100° F. in the shade in Australia, the number of *Orcus chalybeus* upon each orange tree could be estimated, as all the beetles came down on the stems near the ground, which was a beautiful sight for an enthusiastic bug-hunter, and from 175 to 300 beetles were collected on each stem; but the larvæ of the same upon the trees were probably ten times as many. It should be understood that these trees are never sprayed.

Some 1,500 different beneficial ladybirds are known at present in the world, and more than half of these will feed upon scale insects. We should do our best to import as many of these as possible, and at the same time guard against any new importations of coccids.

It is not that we should exterminate our scale insects—this is a matter of impossibility even with the best of natural enemies or parasites, and would be contrary to nature; but we can, with the proper natural enemies, keep these insects in check to such an extent that they will not injure our trees, and fruit growing will be possible for all time to come.

Respectfully yours,

ALBERT KOEBELE.

ALAMEDA, CAL., November 14, 1892.

DISCUSSION ON MR. MOTHERAL'S PAPER.

MR. BLOWERS: I suppose I have had as much experience with the Muscat, the raisin grape of California, as any other man in the hall, consequently I am interested in regard to this coulure spoken of in Mr. Motheral's essay. I find in my experience that there is not one cause alone, but several causes that will produce it. In the first place, if you irrigate, just previous to the blooming of the Muscat, with cold water on a cold day, it will produce a decided loss of your crop; you can irrigate with more water three weeks later, when a second crop is blooming, and it will produce no such result, from the fact that it has not checked the circulation of the sap, which is followed by an increased circulation that destroys the bloom; consequently, it is injurious to irrigate, preceding

the blooming, with cold water. Second, as to the thrips spoken of by Professor Woodworth. I have spoken with more than fifty persons who have suffered from the effects of the thrips, and I have not been able to find any way of getting rid of them; probably that will come some other time, but the thrips propagate in the terminal bud of most all of the trees we grow, especially the apricot and the prune, and as quick as the grape begins to come into bloom, it lives on the honey and prevents the fertilization of the flower. I have no objection to the proposition made by Mr. Motheral in reference to the exudation of salts; it is probably in some places correct, but there are probably not less than four antagonistic causes that produce the dropping of the Muscat. Do you find this coulure confined to certain varieties of fruit?

MR. MOTHERAL: It affects the white grape most. You find it a little upon Thompson's Seedless and Seedless Sultanas, but with the black grape I have never discovered it.

MR. BLOWERS: It is always with those that bloom after the cap has been removed from the flower. The fertilization of the Tokay takes place under the cap, before it becomes disassociated with the stem; the fertilization of the Muscat takes place after the cap has been partially removed. I find in my experience of thirty years that the coulure affects no grape that fertilizes underneath the cap.

MR. MOTHERAL: Will Mr. Blowers tell us if it is a fact that all the black grapes fertilize just as the Flaming Tokay?

MR. BLOWERS: Not all of them.

MR. MOTHERAL: What varieties do not that you know?

MR. BLOWERS: I think the Portuguese grape, called the Black Ferrara, fertilizes like the Muscat and is subject to the coulure in the same way.

MR. MOTHERAL: I have not observed that, sir, and I shall experiment in that line next season.

MR. EVELIN, of Santa Rosa: Has early or late pruning any effect upon the foliage coming out—whether by late pruning the foliage could not come out later than by pruning earlier. It would seem that if the cold nights are the cause of this trouble, that it might be benefited in some such manner.

MR. MOTHERAL: If you prune late, your vines bleed, and bleed profusely, especially if it is very late, and that always affects the vitality of the sap, and throws it back; but whether or not it can be done in such a way as to affect coulure I do not know, because there is nothing in the climate of this country that is regular—sometimes we have these cold nights later in the season, when the vines have grown several feet; we could not wait that long—sometimes it comes earlier; sometimes just as the plant begins to bud. This time it is irregular, you can't tell anything about it.

MR. EVELIN: I would like to ask Mr. Motheral if it is not considered an advantage to have the vine bleed some when it is pruned. I have understood it was.

MR. MOTHERAL: We used to have a good deal of nonsense, which we have abandoned. We at one time concluded that the black knot was the result of too much sap, therefore we pruned late; but I cannot see one particle of difference between the two.

PROFESSOR WOODWORTH: I think it would be well for us always to recognize that by naming this affection coulure we do not make a single disease of it. There are a great many things that are called coulure.

Coulure is a name for the falling of the blossoms, and it occurs in all countries and from a great variety of causes; in some places it is caused by mildew; in other places, like Fresno, it is caused by alkali, and I suppose there are any number of different causes in different localities. I am sure that a rain at a proper time might produce the result upon some plants, especially upon peach trees in the Eastern States. I would like to ask Mr. Motheral what evidence really there is that this alkali, which he finds upon the plant, comes through the plant. Doesn't that come through the air as dust, and light upon the plants that are wet with dew, and gather there? It is exactly the same in chemical composition to the dust that flies in the air.

MR. MOTHERAL: If Mr. Woodworth would look through a microscope as frequently as we have done, I think he would say it was not dust; if dust, it would not have that clear, transparent, crystal appearance. The dust down there is not transparent.

MR. WOODWORTH: I recognize that; but Mr. Motheral has already told us that it will dissolve in water. Now, if that is dust, whether it is clear or not, it will light upon the plant, and if it is covered with water I think that the salts will very easily dissolve, and then crystallize into these clear, shiny crystals.

MR. BLOWERS: I would like to make this statement: Anything that would destroy the proper balance between the masculine and the feminine in the Muscat, whether it is an excess of water, or whether it is a lack of water, or being a lack of moisture or a lack of honey, from being taken by the thrips, or dried up by the north wind before the pollen is ready to fertilize the plant—any of these causes will produce the same result. The small grapes are produced by the lack of fertilization; they drop when there is no fertilization, and there is no difficulty in tracing to its source the different causes, if they are properly watched and in time. In Yolo County a north wind, coming at a certain time before the pollen is ready to fertilize, the plant will crack the cap that protects the flower, and the wind will dry up the honey before the pollen is ready to fertilize the plant, and coulure, or dropping of the grape, is the consequence.

Recess.

XV.

AFTERNOON SESSION.

Vice-President HERSEY in the chair.

ROOT KNOTS.

COLONEL HERSEY: I have an orchard afflicted with little knots on the roots; knots are the size of a hen's egg. If any person knows about it, I would like to hear from him in relation to it for a few minutes. It is getting to be something of a serious matter here, with myself at least, for I shall have to take out from thirty to sixty trees of the largest growth in my orchard. This knot may be found upon prune trees, apricot trees, almond trees, and peach trees—all of that class.

PROFESSOR SMITH, of Palo Alto: I will say that the root knot has puzzled the scientists of the United States for several years, and at this time the University at Berkeley, the Stanford University, and the Cornell University are all working upon it, as well as several scientists throughout the country, and every investigation is being made that possibly can be made by the scientific men, who notice the peculiarities of the disease and will report thereon.

COLONEL HERSEY: Is there any method of procedure advised so far as they have gone?

PROFESSOR SMITH: None whatever, and we know very little about it; we are not even satisfied whether it is the result of a fungous disease or of an insect.

MR. JACOBS: I know of an orchard where there have been root knots on the trees for several years, and this past season they have borne as well as usual. Of course, there are some few dying, but I don't really think that when it appears on the tree it pays to dig that tree up immediately. That it eventually kills the tree, I do not think there is any doubt. In nurseries on land that has been out in alfalfa, especially the first year after you break up the alfalfa, if you put in seedlings of any kind—it don't seem to make much difference what kind—the knots will be worse than on land that has been cultivated to other crops for years. I know of one large stock, this year, of not less than six hundred thousand. There was an alfalfa field plowed up last year and planted to peach trees largely; but I think there were about thirty-five thousand came from Myrobalan stock that I imported myself from France, and which appeared to be in perfect condition, and they are utterly ruined. I planted that same stock myself, a large quantity, and there is not a sign of it on my place. We suspect that it is a parasite or insect of some kind that feeds on the alfalfa roots. It is worse in that kind of land.

COLONEL HERSEY: Was that field pastured or cut for hay?

MR. JACOBS: It was pastured, and had been for years. And another one that was utterly ruined last year has been a pasture, to my knowledge, for seven years, and on that there was not a solitary plant, out of probably fifty thousand that I saw, that was not affected by the knot. One of those I refer to is near Farmersville, about eight miles from Visalia. There are two kinds of the knot—a common black knot, and also a small knot. Some of these knots are about the size of wheat grains, or white beans perhaps, and strung all along on the little white roots. There will be perhaps a space of a quarter or a half inch between them, so that on each plant there may be hundreds of those knots. They literally cover the root from end to end.

COLONEL MCGLINCY: I have a neighbor who, three or four years ago, planted an orchard of prunes, and two years ago he found they were covered with root knot, and he dug up nearly all of the trees excepting a few. On those trees he experimented, by taking a knife and cutting off the knot as well as he could. On the cut he applied common salt. The result was the knot disappeared entirely, and those trees are growing finely. Had he made that experiment earlier, it would have saved him planting an orchard a second time.

FRUIT VS. WHEAT.**A Discussion of the Relative Importance of Wheat Growing and Fruit Growing in California.**

By GEN. N. P. CHIPMAN, of Red Bluff.

At your annual convention held at Chico, in November, 1888, I read a paper entitled "Wheat vs. Fruit," in which I undertook to point out to the California agriculturist the increasing importance of fruit growing in this State, and why we should grow more fruit and less wheat. I am now requested to reexamine the relative importance of the two industries in the light of later experience and more complete data. Whether we narrow the question to the simple inquiry as to which is the more profitable on a given number of acres, or take the broader view as to their relative influence on the future greatness and prosperity of the State, I think we shall easily reach the conclusion for which intelligent horticulturists of California have long contended.

The evolution of California has presented a series of surprises from the day when Marshall turned up the glittering nuggets in Sutter's mill-race and set the world ablaze with his discovery of gold. The growing of the cereals, and later of fruits, was as much a discovery as the finding of gold; and people were even more incredulous about the practicability and profitableness of tilling the soil than they were about making quick fortunes with the pick and shovel and rocker in the mountain gorges. Here and there; however, in the North and in the South, in the early forties, were to be found unmistakable evidences of what our climate and soil would do; but our people seemed not to admit the logic of facts or their own senses, and so they went on for years importing flour from Boston and New York, and fruits from Mexico and the islands of the sea.

Wheat growing took root at last in the fifties, but our eyes were not really opened to the possibilities of fruit growing until the profound movement began which has made Southern California a veritable Eden, and has incidentally uncovered new and untold wealth in the North in her fruit products. We had a surpassingly favorable climate, but we didn't know its commercial value, nor its true relation to the soil. And we are still unwilling to subject these two combined forces to their highest uses, as we evidence by keeping right on planting wheat that can be better grown in the icy regions of the Northwest; and we do this in the face of the fact that we send 70 or 80 per cent of it 15,000 miles to market, in competition with the whole world, and especially with our brothers of the Northwest, who only need to seek a foreign market for about 20 or 25 per cent. And, withal, California only exports about one tenth of our total exports.

DIVERSIFICATION A NECESSITY.

I hold it to be a perversion of nature's gifts to use them contrary to their obviously higher and better purposes. In the old agricultural countries the farmer makes a careful study of adaptability of soil and climate to the growth of particular products. He selects his land for wheat, for corn, for oats, for barley, rye, grasses, and he rotates these crops as necessity requires. He plants the fruits and vegetables suitable

to the climate and soil, and if he is intelligent he always plants that which promises the richest returns. If he is in Dakota, he plants wheat; if in Kansas or Iowa, corn and wheat; if in North Carolina, rice and cotton; if in Louisiana, sugarcane; in France he grows prunes, in Spain raisins, and in Italy olives. He diversifies largely everywhere, but his staple is determined by the conditions of soil and climate.

Now, no one in the face of the facts will say that California is peculiarly adapted to wheat growing. A study of the productiveness of the wheat-growing regions of the Union will show that many States produce more to the acre than we do. The average gross yield per acre of wheat in California is less than 13 bushels, of the value of \$12 34 per acre, which was the result obtained in 1891—one of our best years.

VALUE OF WHEAT LANDS.

The average value of our best wheat land is not less than \$50. When we deduct from the gross product the cost of production, we have left less than an average of \$2 50 per annum per acre, out of which must be paid taxes and the repairs of implements and the farm kept up. Now, this is a summer-fallow crop, of which we get one in two years, and an added occasional winter crop once in three years. In exceptional cases much better returns are shown; but we must deal with general rather than exceptional results with wheat, as with fruit. I am authorized to say to you, by one of the best farmers in this State, who owns one of our best and largest wheat ranches, that his wheat land does not pay over 5 per cent per annum on the assessed value of \$50 per acre for the land.

I pointed out to you four years ago some of the disadvantages of wheat growing in California. Let me restate some of them briefly, with one or two added. We have a much smaller home market than our competitors in the wheat-growing States east of the Rocky Mountains. The United States exports about 25 per cent of all wheat grown; California exports fully 75 per cent of her wheat. Our surplus travels farther to market, and hence at greater cost, than any other wheat grown, except that of Oregon and Washington. We have no one advantage over our competitors to compensate this disadvantage. The water rates on wheat from Chicago to Liverpool are about \$3 50 per ton. The average rates for a period of years from San Francisco to Liverpool will not vary much from \$10 per ton. Assuming that the cost to Lake ports is about the same as to San Francisco from the farm, we have a difference in favor of the wheat growers of the West on his exported wheat of over \$6 per ton, or nearly 20 cents a bushel. But the wheat farmer near the centers of consumption gets a home-market price larger than the export price, while our home price is the Liverpool price, less cost of carriage.

THE WHEAT AREA UNLIMITED.

The "California Fruit Grower," one of the ablest trade and fruit journals in the State, recently pointed out, and fully proved, the statement that the wheat area of the United States can be expanded to meet any probable requirements for many years. It demonstrated what I have verified by examination of the reports of the Bureau of Statistics, that many of our Western States have curtailed their wheat acreage and devoted it to corn and other products found to be more profitable; but

they can easily shift to wheat when required. For example, Iowa had in 1891 in wheat 1,800,000 acres, while in 1875 she had 3,000,000 acres; Illinois had 3,600,000 acres planted in 1880, and only 1,900,000 in 1891. On the other hand, the capacity to rapidly increase production of wheat is shown in Kansas, where the acreage in 1891 ran up to 3,500,000, as against 1,600,000 in 1889, and 2,000,000 acres in 1890; Dakotas have increased steadily from 1,000,000 acres in 1883 to 4,800,000 acres in 1891.

I see no evidence of a decrease of wheat areas either in the United States or in competing foreign countries, so that the wheat grower need not look for better prices through any falling off in production, save in years of crop failures, unless the land is given over to other cereals, which is not likely to happen; and if it should happen can be given back to wheat when needed.

MORE WHEAT PER CAPITA THAN EVER.

Mr. J. R. Dodge, statistician of the Agricultural Department, in the report of that department for 1891, has furnished valuable facts and opinions resulting from his researches. In speaking of wheat, he calls attention to the fact that the population of the country is between three and four times as large as in 1840; the wheat crop of 1891 was seven times as large as in 1840; or $4\frac{1}{2}$ bushels for each unit of population then, and $9\frac{1}{2}$ bushels now. He says further: "There has been much written for twenty years past, the result of crude generalizing from agricultural data, to the effect that wheat growing is declining, moving westward, abandoned in the old States and precociously developing in the new. * * * A little thoughtful review of the whole field of fact will show the kaleidoscopic changes incident to the work of diversifying and molding our primitive agriculture. Western New York produces as much wheat as ever, and fruit and vegetables and other products of ten-fold greater aggregate value. So do Ohio and Michigan."

He then shows how the yield of wheat may be largely increased by better methods; he cites the larger yields in the sands of Holland and the gravelly clays of England, and says that if our better soil were brought to the average yield of those countries, we would produce on the same area as now used a thousand million bushels. He then takes up the question of reserve and shows that the tendency is to underestimate; that the surplus of two or three years, held in remote regions not easy of access—in Russia and India and elsewhere—have been collected through improved commercial facilities and poured into the centers of trade, to the surprise of both consumers and producers, to the equalization of prices and the maintaining of relatively low rates throughout the world.

SINGLE CROPS RESPONSIBLE.

In speaking of the depressed prices, he refers the condition to the baneful influence of the single-crop idea.

Upon the question of the permanency of agricultural production, he presents some striking and valuable facts. He points out: that Europe, with four times our population, produces nearly enough subsistence for her own use; that all eastern Europe has a surplus, and that Italy's exports equal her imports; that the Netherlands, with only two and one half acres to each inhabitant, require only a few million dollars' worth

of agricultural imports in excess of agricultural exports; that France, with a population nine times as dense as ours, requires only about 7 per cent of her consumption; that even insular and factory-studded Great Britain feeds half her population from her own soil, through the labor of one eighth of her population, and the other half could be fed if the game preserves and pleasure grounds were utilized for agriculture; that it requires four times as much area here to feed one person as it does there, which it would be absurd to claim as a necessity.

He then shows, by incontestable proofs, that even in the States east of the Mississippi River land actually farmed is only partially utilized.

Upon the question of surplus he shows how easily possible it is to largely increase the output as the markets may demand, and that our wheat possibility is one of price and profit, and not of land and labor. He then submits tables to show that wheat growing in Europe is not declining. In his conclusions upon the subject he says:

"This country has not reached the limit of agricultural production; it has not even approached it. It is not true that the wheat of the world is declining. It is not difficult to prove the existence of 2,300,000,000 bushels as an average, and there is no prospect of decrease.

"The United States will continue to produce a surplus for export until the wheat culture of the United States shall have given place to more varied and profitable culture, and increasing numbers of non-agricultural population shall require for breadstuffs the entire crop." He adds:

"It is proper to say that the tendency is toward a better distribution of crops, and to higher prices and better profits. The proportion of agricultural labor will decrease, non-agricultural labor will increase, agricultural products will be more varied, rural intelligence and skill will advance, and the farmer will be in a better position to demand and secure an equitable share in the net proceeds of national industries."

If there is one lingering doubt in the mind of a California farmer, after reading carefully the report of the Agricultural Department for 1891, as to the plain path for him, I confess inability to reason from known data.

SMALL WHEAT FARMERS DRIVEN TO THE WALL.

It has come to pass in California that the more prosperous wheat growers must own or till large areas, and use steam and horse power, and dispense with men. The combined harvester has reversed the law of labor-saving machinery, and is depopulating the State. It came at the wrong time for California; and proved a boon to the large land holder, but a bane to the State.

I showed you in my former discussion of the subject, by incontestable evidence, that our wheat lands are not yielding so much per acre as they formerly did, and the four years have added strength to that point; that prices have gradually declined, while rates of transportation do not decline to meet the fall in prices, and this point still stands good; that the price is not likely to come back to former figures, because of the large wheat areas of the globe; that wheat growing cannot populate the State or increase its prestige and importance, or add to its wealth, and this point is more than verified by the fact that our wheat-growing regions are still sparsely settled; that we have reached the maximum of production; that many lands devoted to wheat are not profitable, by

reason of non-adaptability to that plant; and that much of the lands in wheat are specially adapted to fruit, and others are not, and should continue to be planted to wheat.

I showed that an intelligent application of ordinary sound judgment, in the light of facts everywhere apparent, should lead our farmers to devote their lands to wheat culture only where more profitable crops could not be grown; and that our output of other crops should be increased, and our wheat brought down to the necessities of our home market and those markets that can be reached with profit. I must be permitted to refer to the arguments then made and facts adduced, rather than to repeat them here.

NOT WHAT IT USED TO BE.

I need not incumber this paper with further additional proofs, to show that wheat growing is not what it once was here, and that it is no longer an attraction to the home-seeker of the East who is looking toward California. We can't sell our lands for wheat growing, at their true value, to Western wheat growers, who would have to exchange two or three acres for one, and leave more favorable conditions than exist here for his pursuit. We who believed in fruit talked to deaf ears when the farmer was getting 2 cents a pound for his wheat and was growing 25 bushels or more to the acre. Now, however, we ask him to look at his ledger and see if he cannot do better. He bought his land for \$5 to \$20 per acre. Our fruit industry has given it high value, and we want him to yield up his rich acres to the demand for higher and better uses.

President Andrews, of Brown University, says in the "North American Review" for November: "Only about one sixth of the cultivable land of the globe is yet occupied."

Let our wheat grower remember that wheat is the product of all lands and climes. Wherever man can live wheat will grow. Not so of the orange, the lemon, the fig, the prune, the olive, the raisin grape, the almond, the apricot, and even the pear or the peach—all distinctively California fruits. France obtains 25 per cent more wheat to the acre than we do, and English farmers obtain more than twice as much as we do. France reports 110,000,000 hectolitres, or over 300,000,000 bushels, grown this year, which is about three fifths as much as the entire crop of the United States.

SOMETHING WRONG IN FARMING.

It is not my province to criticise our methods; but there is something wrong in our farming, when France with an area only about one fourth larger than that of California, can, with all her other products, turn out three fifths as much wheat as the entire United States. It looks as though we were misusing the term *poor* when we talk about the *poor* farmer. We use it as an adjective of commiseration, when it should properly apply to him as an adjective of reprobation. They have been growing wheat in France and England for centuries, and the land does not give out for the reason that it is well farmed and kept replenished. We grow wheat till we exhaust the soil, and then move to a new region. I have a wheat-growing neighbor who, the other day, sold a thousand loads of manure for 10 cents a wagon load—the accumulation of years—and yet he told me with tears in his eyes that he would have to sell out

because his land wouldn't raise wheat like it used to. I need hardly add that it was an intelligent orchardist who bought the manure.

The point remains, that we have in the United States the fertility of soil, with good farming, to immensely increase our yield of wheat whenever it is needed.

OUR SUPERIOR CLIMATE AND SOIL.

What is it that gives value to California land? It is not richness of soil alone, for Kansas and the great Northwest have the fattest land in the world. It is not in the profitableness of our cereal crops, for our grain farmers will testify that they are not making money. What, then, is it? It is the adaptability of climate and soil to the production of the most profitable fruits of the earth.

But California is not to be built up by her climate alone, for mankind cannot exist on climate. The State is not to be built up by the richness of soil alone, for men will not go thousands of miles and pay more for land than land equally fertile will cost near home.

The solution of California's future greatness lies in the success of the efforts which this State Board of Horticulture has been so patriotically making for the past ten or fifteen years. The day will come when all Californians will honor above all others the men who founded this society, and who have so faithfully promoted the growth of horticulture through its efforts.

CALIFORNIA'S EXTENSIVE CAPABILITIES.

And this brings me to the easy and pleasing duty of showing what has lifted California to her high plane of promise, and why California to-day offers such unexampled inducements to the home-seeker, and why fruit is more profitable than wheat.

For nearly or quite 700 miles, from Shasta to San Diego, and wherever the elevation is not greater than 1,500 feet (and in places over 2,500) lies a great empire, with all the gifts of nature that the Giver of all good has so bountifully bestowed upon France, Italy, and Spain. The lines of equal temperature that sixteen years of daily official observations of the Signal Service Bureau, and later the Weather Bureau of the United States, have traced upon the map, are incontestable records of our wonderful climate. The line marking 35° above zero, minimum temperature for the year, starts on the Pacific coast near Cape Mendocino, and runs through the valleys near Los Angeles, down to San Diego, and disappears in Mexico, and emerges on the Atlantic coast at Cedar Keys, Florida, 600 miles farther south than where it started. The zero line starts on the Atlantic coast near New Haven, Conn.; runs through St. Louis, Santa Fe, Prescott, Arizona, and then turns north and enters British Columbia east of Spokane, Washington. The lines of 5°, 10°, 15°, and even 20° above zero, starting at various points on the Atlantic, from about Sandy Hook down to Hatteras, run across the continent and into British Columbia, without reaching any of our low altitude valleys from Shasta to San Diego. The minimum line of 25° above zero passes east of Red Bluff, a little east of Visalia and Riverside, runs into Mexico, and appears again at Wilmington, N. C.

While we are pruning, planting, and working in our orchards and putting in our winter-sown grain in January, the thermometer marks

14° below zero in Chicago, 31° below at St. Paul, and 39° below at Bismarck, Dakota. While we are shipping our late green fruits in November, the thermometer is playing with zero at the points named in the West.

These are striking differences, and they are what give the high value to California homes and California agriculture.

INCREDIBLE RANGE OF PRODUCTS.

The region to which I have referred lying west of the Sierra embraces 20,000,000 acres, where may be grown every product known to the map of all Europe. The range of products that lies between the date palm and the hardy apple is prodigious. It exists nowhere in any one country on God's footstool except in California. Within that range lies greater wealth than it has yet entered into our minds to conceive.

WEALTH IN OLIVES.

Consider that precious fruit, the olive. The most accomplished agronomists accord to California all the favorable conditions existing in Italy for the growth of this valuable fruit.

Italy produces annually 70,000,000 gallons of olive oil. The market value of this oil, in Italy, is not less than \$120,000,000, and that is more money than the value of all the wheat exports of the United States for 1891.

The precocity and fecundity of California soil and climate are strikingly exhibited in the olive. I am told that it takes ten or fifteen years to bring the olive into profitable bearing in Italy. Our distinguished President, Mr. Ellwood Cooper, obtains ten bottles of oil from seven-year-old trees, and every bottle worth a dollar.

So wise and far-seeing a man as the senior Senator from California is quoted as saying that olive culture has been killed by the substitution of cotton-seed oil for the genuine article. I must doubt the authority of any one to commit Governor Stanford to that statement. I would as soon expect from him the opinion that oleomargarine would kill the dairy business, or that effervescent cider would displace champagne. We eat the cotton-seed oil because we cannot get pure olive oil, and not because of its cheapness or because it is satisfactory. When our olive orchards are able to supply the demand, and we compel the cotton-seed oil to put on the brand of its ignoble origin, and take off the lie which sells it, we shall see very few people dressing salads with the spurious article.

The possibilities of the olive in California are little appreciated. So much is already known of our citrus and our deciduous fruits, that I must be pardoned if I emphasize the importance of greater attention to the olive.

Happily we have the highest and most conclusive evidence in the archives of our society, albeit they have been overlooked in the mass of other valuable matter that enriches our annual reports. When the olive was under discussion at one of our conventions (see Report of 1887-8), Mr. Ellwood Cooper took the witness stand. His testimony will be accepted with the same faith that would be accorded to the evidence of our most eminent citizen. I quote:

"I have growing on my place olive trees in the black adobe, in deep bottom land, in sandy land made from the wash of the mountains, on stony hillsides and adobe hillsides, and on table land where the subsoil is probably twenty feet deep, dark clay; and so far as I have known, there is no difference in the bearing of these trees or in the oil made." As to quantity produced, he says: "The only test I have ever made as to the quantities borne by an orchard—that is, taking all the trees—showed one hundred and twenty-two pounds of olives throughout the orchard—large trees and small—seven years old *from the cuttings*. The best result in making oil has been 10½ pounds in one large bottle; the poorest result was 12½ pounds. We have from the tree seven years old at least ten bottles of oil; and those bottles will sell readily anywhere and everywhere at \$1 apiece. I was compelled to put up the price to \$2—\$24 a case—to keep my customers from quarreling about it; and I am sorry to say they quarreled about it just the same. As soon as I have enough I shall put it back to \$12 a case. One dollar for a large bottle of oil is profit enough for an olive orchard."

At the convention held at Chico, the Hon. Charles Dondero, of San Francisco, a consular representative of Italy, presented a most valuable paper upon the subject. He was born among olive groves, and brought with him to his new home a love for this precious tree amounting almost to adoration. I quote from his admirable and exhaustive address before the Chico Horticultural Convention, November 22, 1888. He says:

"There are no two countries in the world so similar in topographical conformation, position, climate, and agricultural products as Italy and California. The olive is justly considered the Providence of Italy. It was undoubtedly cultivated there before Cassandra's prediction on the fate of Troy—before Homer had immortalized the wrath of Achilles. According to history, the great olive trees yet seen around Tivoli, whose gigantic forms rival the majestic sequoias of the Sierra, were already old when Romulus traced with a plow the walls of Rome. Since then mighty rulers, powerful empires, bright and barbarous civilizations, have arisen and disappeared; but the olive giants, untouched by all vandalic invaders, respected by the hurricanes of thirty centuries, are there, covering nearly an acre of ground each, vigorous and productive as in the days of Christ. The average duration of this tree, however, is considered two hundred and fifty years—long enough for us all. Its production increases until the age of forty or fifty. It remains then about the same from year to year, if properly managed, with a perceptible improvement in the quality of the oil.

"Italy," he says, "produces more olive oil than all other countries combined—France, 1,250,000 gallons; Portugal, Algeria, Tripoli, Egypt, Greece, Dalmatia, and some other countries, 18,000,000 gallons; Spain, 15,000,000 gallons; Italy, 70,000,000 gallons."

THE OLIVE IN ITALY

Speaking of Italy, Mr. Dondero says:

"An olive grove in that country constitutes the luxury of the wealthy, the resource of the poor, the blessing of all. Polenta (a cornmeal mush), with olive oil and wine, is the most substantial noon meal of millions of hard-working Italians. It is due to the providential olive oil that Italy never had to suffer during the appalling pestilences and barbarous inva-

sions of the Dark Ages, or at any other ancient or modern period such fearful famines as other countries had. Garibaldi and his fearless followers would not have won the desperate battle of Milazzo, and broken the chains of tyranny to eleven millions of people, if the providential oil had not saved them from starvation. It lingers yet in my memory, a saying of my grandmother, at the time when the rapacious legions of the first Napoleon on one side and the cruel Austrian hordes on the other were desolating her home and olive plantation: 'Children, as long as we have in the wall-pit a sack of bran and a jar of oil, God is with us and our country.'

It is difficult to conceive how great would be the increase of wealth to our State by the cultivation of this fruit alone. Assuming Mr. Cooper's results to be obtainable, one acre out of every five hundred acres adapted to olive culture in this State would produce more in value than all our wheat exports.

VALUE OF THE ORANGE.

How long is it since we found commercial value in the orange? It seems but yesterday. And yet Southern California has been enriched by the discovery. In 1891 they received \$1,796,000 for oranges alone, and this from a comparatively small acreage. Riverside shipped fifteen carloads in 1880-81, and in 1889-90 she shipped one thousand five hundred carloads. Both olives and oranges are now grown in commercial quantities at points six hundred miles apart north and south. In Tehama and Butte Counties—latitude corresponding with New York City; and in San Diego—in latitude corresponding with Charleston, South Carolina—these fruits are found. Practically parallels of latitude are non-existent as indicating temperature.

RAISINS AND PRUNES.

Our raisin and prune industries are examples of what may be done in California fruit growing. The rapid growth and development of Fresno County is directly traceable to the raisin. In 1880 her population was 9,478; in 1890 it was 32,026. In 1880 Fresno City had a population of 1,112; in 1890 it had increased to 10,818, or 872 per cent. Fruit growing did this. Would this magic-like transformation have happened if fruit trees and vines had not been planted? Would this all have happened if fruit growing had not been profitable? Fresno is an interior city about ten hours by cars from San Francisco, and has no water communication. There was nothing especially attractive in soil or climate above a hundred other places in Northern California. Nothing but the logic of rich rewards to the horticulturist gave Fresno her prestige, and nothing now can ever rob her of it. Her destiny is assured. But this is only a type of California's productiveness to be found elsewhere in the State.

After the fruit crop of 1890 had all gone into market, I undertook to verify the belief of fruit growers that their exports equaled in value the exports of wheat. The claim was ridiculed as preposterous. The wheat grower felt himself aggrieved, and his occupation belittled. He never stopped to think that we had gone along with our pottering business without taking away his wheat lands from him, and had added wealth to the State without taking away a dollar, and that he could afford to

be just to us if he did pity our folly. And so I set about gathering the facts which I afterwards embodied in a detailed report to the State Board of Trade. The result was an unexpected victory for fruit, and showed that our fruit and wine exports for that year reached \$19,857,826, while wheat and flour exports fell short \$530,660.

ENORMOUS VALUE OF FRUIT PRODUCTS.

It is due to the completeness of our records that the comparison should be given in this paper. It is as follows:

Fruit Exports.

Green deciduous fruits, 68,084,124 pounds, at 2½ cents	\$1,702,103
Dried deciduous fruits, 64,596,181 pounds, at 12½ cents	8,074,397
Raisins, 41,120,330 pounds, at 6½ cents	2,670,020
Nuts, 1,574,230 pounds, at 10 cents	157,423
Canned fruits, 80,121,950 pounds, at 3 cents	2,403,658
Oranges, 1,023,700 boxes, at \$1.75	1,793,025
Grapes, in wine, 18,000,000 gallons, at 15 cents	2,700,000
Grapes, in brandy, 1,000,000 gallons, at 45 cents	450,000
	\$19,857,826

Wheat Exports.

Wheat	21,699,683 bushels.	
Flour	5,910,555 bushels of wheat.	
Total	27,610,238 bushels, at 70 cents	\$19,327,166
Excess value of fruit		\$530,660

Let us turn back a decade. In 1880 we exported 3,141,500 pounds of green fruit and 412,480 pounds of dried fruit, besides our raisins and canned fruit. Little wonder is it that the contemptuous beginning of 1880 had moved the wheat growers to pity for the misguided fruit grower. And yet in ten years we added \$20,000,000 annually to the wealth of the State, without diminishing the possibilities of wheat growing by so much as a bushel. Indeed, our wheat output for 1891 has never been but once before equaled.

NORTHERN AND SOUTHERN PRODUCTS.

In that same report was another instructive table that deserves an incidental place in our records. It shows what part of that fruit went from Northern California and what from the South. It is as follows:

	North.		South.	
Dried	38,524,900 lbs.	\$4,815,613	26,070,281 lbs.	\$3,258,785
Green	67,030,834 lbs.	1,675,771	1,053,290 lbs.	26,332
Raisins	25,596,330 lbs.	1,599,706	15,525,000 lbs.	970,312
Canned	77,413,020 lbs.	2,322,390	2,708,930 lbs.	81,267
Nuts	356,510 lbs.	35,651	1,217,730 lbs.	121,772
Oranges		4,200		1,793,025
Wine	16,000,000 gals.	2,400,000	2,000,000 gals.	300,000
Brandy	800,000 gals.	360,000	200,000 gals.	70,000
Total North		\$13,213,330	Total South	\$6,644,493

DIFFERENCES IN THESE REGIONS.

Some deductions drawn are worthy of repetition:

"It will be noted that green deciduous fruits are nearly all shipped from the North; that shipments of dried fruit from the North exceed those from the South over 11,000,000 pounds; that five eighths of the raisins go from the North; that nearly all the canned goods go from the North; that of the wine and brandy, eight ninths go from the North; that nearly all the nuts, and, practically, all the oranges, go from the South. It will also be noted that the green deciduous fruits exported from the State about equal the value of oranges; that the dried fruits are more than four times the value of oranges; that our raisins have a value of nearly \$1,000,000 more than oranges, and our canned goods more than \$500,000 more than oranges; that our wines and brandies have a value to the producer of \$1,250,000 more than oranges. Also, that the exports of deciduous fruits and nuts exceed exports of oranges by \$17,000,000. It will also be noted that the value of the dried fruit shipped from the South is about double the value of her oranges; that the raisins of the South equal half the value of the oranges, and that the orange crop of the South is only about one fourth in value of her whole fruit crop."

I have tried by every mental process at my command, and on many occasions, to emphasize and make clear the great value and attractions of our developed fruit regions. I never weary of this effort, for I feel my conscience as clear in helping to establish new homes in California as the most zealous missionary ever felt in leading the benighted heathen into the New Jerusalem.

The one thing that I cannot understand is, that we have not five million population, instead of one and a quarter million.

VALUE OF SANTA CLARA VALLEY.

Did you ever try to figure out what the Santa Clara Valley would sell for, if it could be picked up and set down with all its advantages of climate and soil as we know them, within, say, one hundred miles of the city of Chicago? The Happy Valley of Rasselas, the Vale of Cashmere, the home of the Peri, and all the other poetic conceptions of all the centuries, have never pictured anything more charming or more valuable than that would be. Every acre would be worth a small fortune. And yet I can conduct you to a hundred places in Northern California equally attractive, where the owners are blindly misusing the soil and squeezing out the last remaining elements of fertility to grow a crop that barely pays cost of production. To my mind it is not less senseless than would be the miner, who would clean up his sluice-boxes and save the pebbles and let the gold go down the gulch.

If you agree with me that the beautiful Santa Clara Valley set down in Illinois would have incalculable value, tell me why it has not approximately that same value here, only four days' ride from Chicago?

WORTH \$1,000 AN ACRE.

If Mr. A. T. Hatch's Suisun orchard could be set down in Iowa, with all its delightful surroundings and all its exuberance and wealth of fruits, would anybody hesitate to pay \$1,000 an acre for it? Can you

give me a satisfactory reason why it may not be nearly as valuable here—not for wheat growing, but for prunes and peaches and almonds and pears—in short, for California fruits?

FRUIT GROWING SUPREME.

I am endeavoring not to depart from my purpose, which is to exalt fruit growing to its well-earned supremacy. If I appear to diverge it will be seen that it is only to give you a fresh view-point. What the fruit grower has unselfishly labored for in all these years has been, and is, to build up a great and powerful commonwealth, by planting industrious families on many of these unpopulated, monotonous, dreary, and unprofitable wheat fields and waste places; and convince their owners that when the Creator selected California as the only place on His footstool where every fruit of every zone might be grown, He intended that we should supply the wants of the teeming millions who were to dwell on the American continent, and he didn't mean that these matchless gifts were to be prostituted to ignoble and profitless uses.

FRUIT VERSUS WHEAT.

The "Rural Press," one of the most watchful guardians of our agricultural and fruit interests, in a recent issue endeavored to console the wheat grower with the hope of getting \$1 50 for his wheat if he would hold a little longer, basing the argument upon the narrow margin of reserves now in store. That very able financier and public-spirited citizen, Mr. Albert Montpelier, was called to the witness stand to support the hypothesis. I hope they are right, and I wish the wheat grower could get \$2 for his wheat. But would Professor Wickson or Mr. Montpelier counsel wheat growing as against fruit growing in California? Certainly not; and for the obvious reason that they both fully realize how vastly more important and more profitable fruit growing is than wheat growing.

Indeed, it may be conceded that wheat may be grown here at a profit, but the fact still remains that fruit is more profitable than wheat can possibly be under any conceivable conditions.

But what evidences have we that these twenty millions of dollars received from fruit in 1890 produced more profit to the fruit grower than the wheat grower got for his wheat, and what evidence that fruit growing is doing what we claim for the State?

There are many ways to prove this. One very effective means is to take localities where fruit growing has become a leading industry, and compare them with those localities where the change to fruit has not become marked.

I need not refer to all the counties where the evidence exists; a few will serve the purpose. The proof rests upon the concurrence of two facts, namely: increase in assessed valuation and increase in the population.

I will take five counties in which fruit growing is a distinctive feature:

County.	Population.		Assessed Value.	
	1880.	1890.	1880.	1890.
Los Angeles.....	33,381	101,454	\$16,368,649	\$69,475,025
San Bernardino.....	7,786	25,497	2,576,973	22,410,440
San Diego.....	8,618	34,987	3,525,258	30,118,503
Fresno.....	9,478	82,026	6,354,596	36,110,343
Santa Clara.....	35,039	48,005	27,603,240	53,193,579

In population, Los Angeles gained 203 per cent; San Bernardino, 227 per cent; San Diego, 305 per cent; Fresno, 237 per cent; and Santa Clara, 37 per cent; and the increase in valuation ran along *pari passu*.

Now, let us consider four wheat counties:

County.	Population.		Assessed Value.	
	1880.	1890.	1880.	1890.
Colusa.....	13,118	14,640	\$12,440,390	\$20,669,809
Butte.....	18,721	17,939	10,743,426	15,839,385
Tehama.....	9,301	9,916	4,199,968	9,121,975
San Joaquin.....	24,349	28,629	17,377,129	32,080,117

Colusa gained in population 11 per cent; Butte lost; Tehama gained 6 per cent, and San Joaquin gained 17 per cent.

WHEAT A POOR ATTRACTION.

It is the proud boast of Colusa that she is the largest wheat-producing county in the world. She has gained 1,522 people in ten years. But what profiteth it the State that she has broad acres of wheat and no growth of population?

Compare San Joaquin and Fresno. The former is a great wheat-growing county, and has not yet developed fruit distinctively. Fresno raises a large amount of wheat also, but has developed fruit largely. Of the two counties, San Joaquin is the more favorably situated as to transportation facilities, and in all respects is equal to Fresno, and they lie near each other, with much the same condition of soil and climate. Fresno has increased 230 per cent in population, and San Joaquin only 17 per cent. San Joaquin has added 4,000 population in ten years, while Fresno has added over 22,000.

If you will study the drift of population in the valley regions of the State you will find it has gone to the fruit-growing counties almost entirely, and thus confirming what we say, that fruit, and not wheat, is to build up California.

I take no pleasure in pointing out to you another remarkable contrast between these two imperial counties. But we are after the truth, and often nothing but the truth will awaken, and must be spoken, however unpleasant.

SAN JOAQUIN COUNTY.

San Joaquin County, in 1880, had residing in towns and in the city of Stockton, 11,822 inhabitants. In 1890 she had increased her urban population to 17,730 inhabitants—a gain of 5,908.

The total gain in the ten years for the whole county was 4,280, which is 1,628 less than the gain in the towns and cities; and this means that there is an actual loss of rural population of 1,628 in ten years, when there ought to have been a gain, and would have been, in my belief, a gain of 8,000 or 10,000, if water had been brought on to the parched wheat fields, and the land surrendered in greater part to fruit. Stockton alone has received four fifths of this gain, and is a lusty and very promising city; but how much stronger it would be with 10,000 more people pouring their wealth into her coffers.

Now turn to Fresno County. In 1880 there resided in the towns 1,417 inhabitants. In 1890 they had increased to 13,635—a gain of 12,218. The total gain in ten years for the whole county was 22,548, which is 10,330 more than the gain in the towns, and this means 10,330 added to the rural population. Fresno added in ten years to her rural population more people than were in the county in 1880, while San Joaquin went back and lost 1,628.

Precisely the same thing has happened in Colusa, and Butte, and Tehama, and other counties where wheat is the staple, the rural population has fallen off.

This emphasizes in the strongest possible manner the point I am making, and should awaken the solicitude of our people.

IF NOT FRUIT, THEN BABIES.

I must not be blamed for this diagnosis. I may be wrong in my remedy, but I am right as to the disease. Let me say to San Joaquin, in all truth and soberness, as I am constantly saying to my own county, there is something wrong. Your broad, rich, and beautiful acres should have more people instead of less after ten years that have added nearly 40 per cent increase to the rest of the State. If you won't take our advice and plant more fruit, at least try and raise more babies.

But I am not through with the wheat grower. It will be observed as a mark of prosperity among fruit growers, compared with the conditions present among many of the wheat ranches, that an atmosphere of thrift and comfort, and even luxury, surrounds the orchard regions, while the wheat grower is content with the same roof that sheltered him twenty years ago, and his hired men continue to roost in the hay mows, and migrate after harvest and disappear with the meadow larks, to reappear from God knows where the following season.

LAZY MEN NEED NOT APPLY.

A slothful, or lazy, or unambitious man has no business with an orchard. He must be observant, industrious, intelligent, a reading man, and he must have to some extent the mercantile faculty. The wheat grower cannot make his market; it is made for him. The fruit grower can make his market by superior cultivation and care of his orchard and handling of his product. His calling develops his higher faculties and makes of him a superior citizen.

Again, the products of the orchard will bear all-rail transportation to the centers of consumption, while wheat can go only by water. Our fruit may be shipped green or dried, and still yield profit, and it is a question in which form it is the more profitable. We thus have the markets of the world, while our wheat has but one point of consignment, and that 15,000 miles away. Our green and dried fruit may now be placed in Liverpool in fifteen days, while our wheat takes four months; and the farmer must bear all the cost of this delay in reaching the consumer. And this item alone means half a year's interest on all his crop. Again, there is more certainty in the fruit crop than in the wheat crop, while prices are at least equally staple. Again, a family can well be supported on ten acres of fruit, and upon less invested capital than in wheat culture. A family can produce more in pounds and in value on 10 acres of fruit than on 150 acres in wheat. This is easily demonstrable.

Ten thousand pounds of green prunes per acre, or 3,330 pounds of dried, is a conservative estimate. Twenty bushels of wheat, or 1,200 pounds, is a large estimate per acre. The farm value of the prunes this year is \$330. The farm value of the wheat is \$15. Our peach orchards will show as many pounds green as of prunes, with half the dried product of prunes, worth this year \$200 per acre.

We have low prices for fruit at times, but never down to cost of production. There never has been a time when good fruit, well handled and cured, did not bring a good profit.

There is in fact but one question that admits of discussion bearing upon the fruit industry of California? We have advanced beyond the experimental stage in all fruit products of the State from Shasta to San Diego. Oranges, lemons, figs, almonds and other nuts, prunes, cherries, apples, peaches, apricots, pears, plums, nectarines, olives, and foreign grapes, are all grown in commercial quantities for 700 miles north and south. Our trees come into bearing quickly, are prolific bearers, are long lived and healthy. The fruit is large and bears shipment green for long distances, and retains much of its lusciousness, and flavor, and attractive appearance.

NO DANGER OF OVER-PRODUCTION.

The sole factor that has not passed beyond dispute relates to the question of over-production, and consequent loss of market. We had this confronting us in 1880, when we exported by rail only 546 carloads, and we had it in 1891, when we shipped 20,706 carloads, including shipments by sea. Strangely enough, there are fewer persons now who doubt the market than there were in 1880, although we export forty pounds now where we shipped one then.

There is one very convincing fact to my mind that the danger of over-production is imaginary. It is this: Our horticulturists are deeply interested in the question; they are, as a class, reflective and intelligent—I think I may truthfully say, a very superior body of men. Their interest and success are deeply involved in knowing the truth of the matter; they are not land agents, and few of them have land for sale. Every personal consideration would lead them to discourage planting, if they thought there was any danger of over-production. But they not only do not discourage, but are doing all they can to encourage it, and are extending their own plantings where they can.

Mr. W. H. Mills, a high authority upon the question of distribution, has recently pointed out the fact that our fruits do not reach over 5,000,000 of our citizens out of the 65,000,000 who will buy them if they can get them.

We shipped by rail to the East in 1891 of green fruit less than three pounds per capita of our population; of dried fruit one pound per capita; of raisins about two thirds of a pound per capita, and of canned fruits about three fourths of a pound per capita—about five and one half pounds per capita of all kinds.

It must be obvious to all that this is only tasting fruit—not eating it. But our population is increasing at the rate of over one and a half million people annually. It will take a thousand acres of new orchards every year to keep pace with this increase alone at the present small per capita consumption. If, however, our fruit is consumed by five million people, they must buy one hundred pounds per capita, which shows our utter inability to over-produce when we shall have reached all the consumers.

OUR MARKET GROWING.

President Andrews, already quoted, says: "Our own country, adding to its numbers by nearly 3 per cent a year, bids fair to approach ninety millions by 1900."

Think of thirty million people to be added in eight years; it is simply appalling; and California must supply them with fruit. Does it not seem more of a problem whether we can do it, even by our rapid planting, than whether we can find purchasers?

But we must not overlook another important fact, that this increase of human beings will not gather along the Atlantic coast. They will push into the great West. The center of population is moving steadily westward. The census of 1890 shows that nearly one half of the increase since 1880 has been west of the Mississippi River. We read the large figures of shipments of our green fruits and think them phenomenal, and hence conclude that we must necessarily glut the market shortly. You will be surprised to know how small a figure our green fruit cuts at the East. A copy of the proceedings of the Western New York Horticultural Society for 1886 came into my hands. Nineteen counties were represented, but only nine gave data from which I could calculate shipments of fruit for 1885.

I found, however, that the nine counties had shipped 387,558,820 pounds of apples that year to a market near home.

Now, California has never sent out in any one year more than half this number of pounds of green deciduous fruits and oranges; indeed, our entire export of green, dried, and canned fruit by rail and by sea in 1891 fell short of the number of pounds shipped from nine counties in the State of New York, in 1885. The total yield of apples from this region in a good year would probably reach 40,000 carloads.

DON'T HAVE TO WAIT LONG YEARS.

Let me tell you another thing which may comfort those who doubt the profitableness of fruit growing. Orchardists in Western New York claim to make a net profit of \$200 to \$300 per acre. A four-acre orchard planted in 1833 was reported as yielding \$400 per acre. Another orchard

bore its first good crop after twenty years. In Monroe County an orchard nineteen years old reported \$400 to the acre. And yet our Eastern brethren accuse us of violating the ninth commandment, when we tell them we get \$200 or \$300 per acre from our orchards, while the fact is we suppress the truth, which is that we often get twice that; and we don't have to wait twenty, or ten, or even six years.

At the risk of pushing the argument beyond reasonable limits (for the question of our ability to sell our fruit is certainly an important one), I must give you another illustration. I have carefully inquired to learn the consumption of fruit by a family of five here in California, and I find that it consumes throughout the year, in all forms, an average of one pound per day, or seventy-five pounds per capita for the year. California now consumes 25 per cent of all we grow, and our State only contains about one fiftieth of the population of the Union. We consume per capita—and we pay good prices for it—seventy-five pounds of our fruit, while we are selling without the State only five and one half pounds per capita of all kinds.

I am utterly unable to turn the light upon this question from any direction without seeing a practically unlimited market.

The "California Fruit Grower," of November 5th, publishes an extract from a letter written to the "Southern Cultivator," relating to the Georgia peach. The claim is made that the Georgia peach growers realize a profit of \$150 to \$300 per acre, and some valuable facts are given to justify the claim.

They pack in cases of six one-gallon baskets, weighing about forty pounds in each case—500 cases to a carload. The freight to New York is 35 cents per case, or \$175 per car; refrigeration, 18 cents; making 53 cents per case in all, or \$265 per car. The cases are set down as costing 24 cents made up; picking, packing, and hauling to the railroad, about 10 cents more, making 35 cents f. o. b. cars. The correspondent further states that a carload of good peaches usually nets the grower about \$1,000. He further reports sales of 480 cases by Snow & Co., of Boston, in August, when Delaware and California peaches were in the market, at \$1,721 75 gross. Allowing usual commissions, it will be seen that \$1,000 per car net to the grower was an inside estimate.

We ought not to be obliged to make affidavits about our profits when the New York apple grower and the Georgia peach grower claim an unchallenged profit of \$200 to \$400 per acre. You will observe that the transportation cost from Georgia to New York is greater than ours from here to New York.

No one can doubt the superiority of the California fruit orchard for certainty of crop, quantity and quality of fruit. Why, then, should any one doubt the profitability of the industry?

Mr. Mortimer Whitehead, Special Agent in charge of Division B of Agriculture of the Eleventh Census—which includes Horticulture—at a meeting of the American Pomological Society in 1891, stated that the peach acreage in the United States was found to be 597,736; the value of the product, \$76,160,400; and that over \$90,000,000 were invested in peach growing in the census year of 1889.

Here is evidence that the American people expend about \$1 25 per capita per annum for peaches alone. It is also evidence showing that the peach orchards as a whole yielded about \$130 per acre. Large as is the peach industry, it is less than one tenth of the whole fruit industries.

Mr. Whitehead stated that the investment in horticultural pursuits will be shown to be more than \$1,000,000,000.

Surely the humble fruit grower may now claim the right to stand beside the noble army of agricultural toilers, whose mission has been to supply the world with articles of food necessary to human existence, and whose calling has been the theme of poets, the care of statesmen, the solicitude of governments, and always will be, as it always has been, regarded as the basis of human progress and human happiness.

THE REAL PROBLEM.

The truth is, that the problem with us is one of transportation and distribution. And this involves the problem of bringing the producer and consumer nearer each other. We are content with $1\frac{1}{2}$ cents per pound for almost any of our green fruit. It will afford a good profit at 1 cent. Add $1\frac{1}{2}$ cents for carriage, and 2 cents for the middle men and for packing, and we have California fruits in the hands of consumers at 5 cents per pound, and this means a three-ounce peach for a cent, or a dozen apricots for a nickle, or three large Bartletts for a dime, or a nice dish of fruit for a family for a quarter. We all know that people will eat fruit in quantities at reasonable prices. The whole solution of the question rests with us in improving and cheapening transportation costs, and not giving the lion's share to the middle men.

FIFTEEN DAYS TO LONDON.

A new and important factor has been introduced in the demonstration that our green fruits can be laid down in good condition in London, and Paris, and Hamburg, in fifteen days. Our dried and canned fruits are also being well received abroad, and this will add immensely to our markets. I think I need not pursue this point further. Many are deterred from engaging in fruit culture, because of the time consumed in building an orchard; because of unfamiliarity with the occupation, and because of the cost.

Now, let us look at these objections a moment. Given the land (which can be bought for from \$25 to \$200 an acre, and if you are content to start in newly developing regions the cheaper land will be found just as good as the dear)—I say, given the land, you can have a paying peach, or almond, or apricot orchard by omitting one summer-fallow crop of wheat; in other words, in four years; in five, a paying prune orchard, and in six, a paying pear orchard. You will get fruit sooner, and considerable of it. From this time each year adds to the value.

NO MYSTERY IN FRUIT GROWING.

As to your unfamiliarity with the business, you have only to study the methods of successful growers around you and apply the ordinary rules of soil tillage and your good, sound, common sense, and nothing more. There is no mystery in the art of fruit growing.

As to the cost, you must consider your investment and its character and value. You sow wheat, and put seven or eight dollars into the ground, and in two years take away twelve or fifteen at most, and must

then repeat the process. Every planting is a new investment and a new venture.

You plant an acre of trees and they will cost you at the end of the first year \$30, which you can reduce to \$25 by your own labor; at the end of the second year you will have paid out \$10 more per acre; the third, \$12 50, and the fourth, \$15; in four years, \$67 50. If you have had some bad luck, you may add enough to make \$75 per acre, or possibly \$80.

The fifth year of apricots, peaches, or almonds you should have a gross income of \$150 per acre, at least half of which should be profit.

The same acre in wheat would have given you two crops in the four years, yielding you a profit of \$15, which is far more than the average, and you will probably get one volunteer crop, making \$20 in all. But at the end of the fourth year you have nothing but the land less productive.

In the case of the orchard, you have built a permanent plant that needs only care and tillage, with an increasing income, and greatly disproportionate to the income from wheat.

Viewing the matter from the standpoint of interest on the investment, and there is increasing advantage in the orchard.

I think fruit growers will corroborate my statement that I have underestimated the orchard and over-stated the wheat field.

DO NOT ABANDON WHEAT GROWING.

I leave the subject with one or two observations. As fruit growers, we do not counsel the abandonment of wheat growing in California by any means. We only say that much of the wheat land should be subdivided and placed in the hands of more people, and subjected to higher and more profitable uses; that our soil and climate are adapted to the growth and production of many valuable fruits that cannot be elsewhere grown in the United States, and that we can find a much more remunerative market than our wheat can ever find; that profitable fruit growing means small holdings and increased population, and a better home market for wheat; that one acre in fruit will yield more profit than fifteen acres in wheat; that fruit growing is a higher order of agriculture, develops a more thoughtful and intelligent man, and conduces to better citizenship, by reason of this higher intelligence; that it will tend to hold our children away from the cities, by making rural life more attractive. In short, it will add to the happiness of the people, and wealth and power and prestige to the State.

VOTE OF THANKS.

On motion, a vote of thanks was tendered to General Chipman for his able essay, and for his presence at the convention.

THE TEN-BLOCK SYSTEM OF NUMBERING COUNTRY HOUSES.

By A. L. BANCROFT, of San Francisco and Contra Costa County.

A Short Explanation.—The roads of an entire county are arranged in as long lengths as practicable and are all named. They are then measured, commencing at the county seat or at the end nearest to it, and each mile is divided into ten equal parts or imaginary blocks, having frontage only. Two numbers are assigned to each block; one to each frontage, the odd ones upon the left and the even ones upon the right—ten blocks to a mile; twenty numbers to a mile. Any house having an entrance in a block has the number of that block. The number for all but the first house in a block is followed by a distinguishing letter—742, 742a, 742b, etc. Divide the even numbers by two and point off one decimal, and the distance in miles and tenths, from the commencement of the road, is shown.

Ever since the days in Damascus, when the Lord sent Ananias into the street which is called Straight to inquire for one Saul of Tarsus, the people of the city have had an advantage over those of the country in being able to find, and direct others how to find, exact localities. In the cities streets are named and houses are numbered, and system and order prevail. In the country neither is done, and chaos rules.



THE MILE MARK.

A full circle for the full mile. X, ten; ten blocks; one mile.

The ten-block system of numbering houses along country roads, and the systematic plan of *naming* all of the roads of the country, which forms a necessary adjunct to it, is an attempt to place the country fully upon an equality with the city in these respects.

While the ten-block system, considered in its close meaning, refers only to the manner of numbering residences, etc., along the thoroughfares of the country, taken in connection with the other features which necessarily and naturally accompany it, the preparation for establishing it includes the arranging of the roads in suitable lengths for applying names, the selection of pleasing and appropriate names, the measuring and blocking off of the roads, numbering the country-house entrances, erecting guide boards, and the publishing of a country directory which will show the location of a country resident with as much exactness, and make it as easy to find any country residence, as it is at present to find a residence when knowing the street and number in the city.

The naming of country places, the advertising of the business specialty of the countryman follow in the same line of rural advancement, as well as the more material improvement of the roads themselves, and the free delivery of mail matter, telegrams, and a country express or package delivery in connection with the postal service.

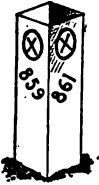
While the ten-block system supplies the one deficiency which at present makes this line of rural advancement impossible, the different steps will be considered in the order which would naturally be followed in establishing the complete plan.



THE HALF MILE MARK.

Half of the circle for the half mile. Half of X making a V. V, five; five blocks; one half mile.

The scheme was developed while working upon these lines in the interests of Contra Costa County somewhat more than two years ago. While at the outset the needs and requirements of Contra Costa were the particular situation to be met, it soon became evident that the plan



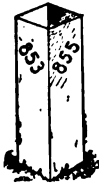
was needed fully as much and would be fully as useful in other country localities as at home, and the study has been from early in the work of its development to formulate a plan which would be generally useful in all country sections. The aim has been to develop a plan, systematic throughout, and to have a good reason for each step taken; to not only find a way to do a thing, but to find the best way to accomplish it. Hundreds



of papers have published accounts of it, and almost invariably to commend it. As the few attempts at criticism have not weakened it a particle, it appears to be safe to consider that its merits are strong enough to justify putting the plan into actual operation.

Contra Costa has adopted the plan officially, and the work of establishing it is now under way. It is frequently spoken of as the "Contra Costa plan."

Listing the Roads.—Before the houses along country roads can be numbered with any degree of satisfaction or usefulness, the situation must be given a shape very different from the one existing at present. The roads must be named, and previous to that being done, thought and study must be given to each stretch of road to be known by the same name.



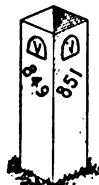
The first step, therefore, would be to arrange the roads into lengths, make a descriptive list of them, and for convenience of reference, number them in the list. This work is or should be a county



affair; should include the entire county, and the county seat is the natural center of the system.

The roads should be arranged in as long lengths as practicable. So long as a road runs in a general direction, or even if it deflects somewhat to either side, provided the angles are not too abrupt, the same name should be continued through towns, across streams, over ridges, and around mountains along its entire length.

In order that system and order may govern throughout this plan, and that the course of the roads be not such that the lines will cross in all directions, they should all commence at the county seat or at the end nearest to it.

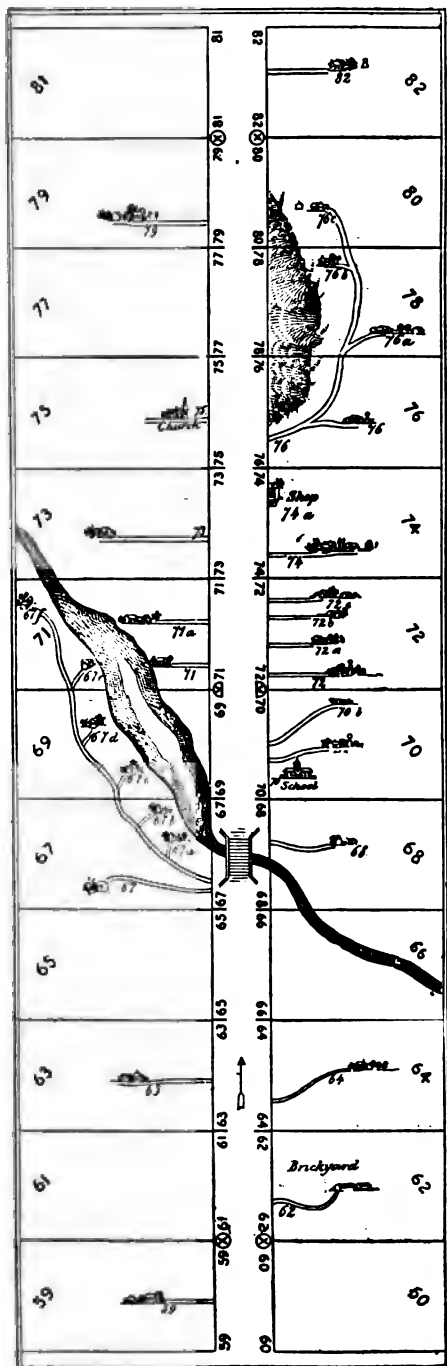


The roads should be listed, commencing with those departing from the county seat northerly, and work around in a circle toward the east, south, west, and back again to the north—the roads branching from these, and their branches follow.

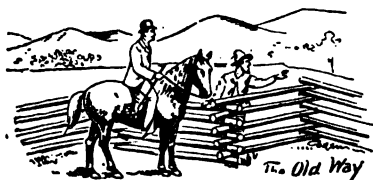


Selecting Names.—In naming the roads the things to be avoided are perhaps even more important than the things to be done. The name of

The Road Marks on Square Posts.—They can be made of wood, stone, or iron. They should be set with the corner of the post toward the road, with the two block numbers on the two faces of the post that can be seen from the roadway. See note on page 176.



THE TEN-BLOCK SYSTEM ILLUSTRATED.



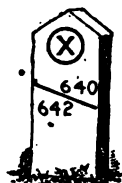
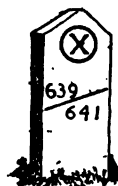
The Ten-Block System Illustrated.—The blocks are imaginary ones, of 528 feet, or one tenth of a mile each, having frontage only. Two numbers are assigned to each block, the odd ones upon the left and the even ones upon the right. Ten blocks to the mile; twenty numbers to the mile. Any house having an ENTRANCE in a block has the number of the block. The number of all but the first house in a block is followed by a distinguishing letter—964, 964a, 964b, etc. The house itself, because of the nature of the country, may be placed at a considerable distance to one side of the entrance, but it is the location of the entrance itself that determines the number. (See block 76, 78, and 80.)

The ten-block system will be very useful in locating other things besides country house entrances. By use of the block numbers all such things as bridges, culverts, places on the roads needing repairing, picnic and camp-meeting grounds, points from which fine views can be obtained, or the particular point on a road where a certain event occurred, can all be located quickly, easily, intelligently, and with exactness.

As all calculations of distance are made from the even numbers in defining the location of an object upon the road, unless the left hand side is definitely intended, the even numbers should be used.

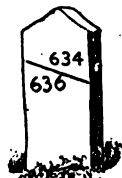
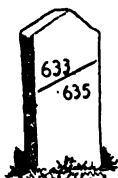


neither terminus is taken, for the reason that it would be appropriate only when traveling toward it. If both termini are taken it becomes more of a description than a name. The name of no living resident upon a road should be taken, for while it might be pleasing to the one whose name was so selected, it would hardly be so to any one else. The possessive case should be avoided; it is awkward to write, and is apt to be incorrectly done.

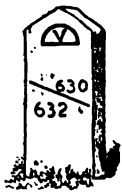
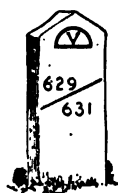


Names should be selected from among the landscape surroundings of the locality; from the historical associations or legends of the place; from its botanical or geological features. An average county is likely to have many more roads than can be given pleasing names from these classes. Other names can be selected from the names of statesmen, army and naval officers, battle fields, naval vessels, forest trees, etc.

The names should be short, easily spelled and pronounced. Two-word names are better than three or more.



In Contra Costa there are one hundred and thirty roads on the list. Some of the names particularly appropriate are Alpha Way, the first on the list. Contra Costa Highway, which extends from Martinez south, completely across the county. It is probably the most prominent road in the county, and the word highway is not used in any other road name. Alhambra Way runs through the valley of that name; Franklin Road through Franklin Cañon; Vista Rio, along the banks of and overlooking the river. Teal Local, Tule Road, Plover Connex, and Pacheco Exit are located near the river and tide lands. Camino Diablo is near the base of Mount Diablo. Solano Way extends in the direction of Solano County. Summer Road is a better road in summer than during the wet season.



Zig Zag Way speaks for itself. Concord Lateral extends out from the town of Concord like the lateral branch of a tree. Via Concordia is a branch of Concord Lateral, and is located near the town of Concord. Lime Ridge Crossing is expressive. Mountain Drive leads to the summit of Mount Diablo. Golden Gate Way extends from Walnut Creek to the county line toward Oakland, and ends in view of the Golden Gate. Walnut Way lies for a part of its length by the side of the stream of Walnut Creek, and has numerous native California walnut trees upon it. La Grange was the

The Road Marks on Flat Posts.—These posts are located at the dividing line between the blocks. The numbers indicate the block upon either side.

The ideal road will be fitted out with the road mark at each block division point, on both sides of the road. They will be on flat, iron posts, with the figures and marks cast on the faces of the posts the way the county guide boards of France are made. The raised figures and marks should also be painted a color different from the face of the post itself.

These flat posts could also be made of stone, with the marks chiseled upon them, or be made of wood, with the marks put on with paint.

The odd numbers upon the left, and the even ones on the right, opposite. Divide the even numbers by two, and point off one decimal, and you have the distance, in miles and tenths, from the commencement of the road to the completion of the block indicated by the number.

name of Lafayette's country home, and De Kalb accompanied him upon his expedition to America during revolutionary times. The roads bear-

ing these two names are located near the town of Lafayette. Camino Pablo commences at the town of San Pablo and extends up San Pablo Creek, through San Pablo Cañon, etc.

There appears to be a decided convenience, if not a necessity, to have certain kinds of roads distinguishable at once by their names. Therefore, three words—local, connex, and exit—have been used to definitely indicate three different classes of roads.

A local, as used in Contra Costa, is a road having no outlet—a neighborhood road. It will frequently be convenient for the traveler to know, before starting on a local, that he must return by the same way. A

connex is a short road having no branches, and useful principally in connecting other more prominent roads. An exit has no outlet except an exit by water. Silva Local, Sara Connex, and Granger Exit are samples of these names.

Unless work of this kind is governed by well-defined lines, it is apt to take some quite incongruous shapes. While one of the central counties of the State is far in advance of most other counties in the attention given to road matters, the names of some of

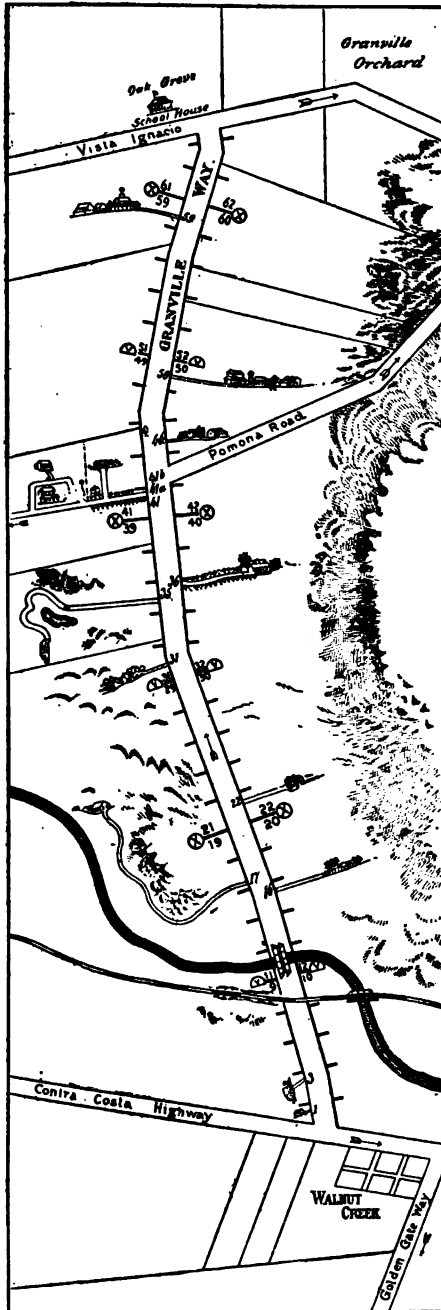
her roads as they stand upon the official register are open to criticism. Such names as the following are to be found, viz.: Hess and Battie

Road; possibly, like the Via Appia in Rome, named for the contractors who built it. Where such names as John Heinlen's Cart Road, T. B. Jamison's Cart Road, and Julius Martin's Public Cart Road (five words) come from it is difficult to conjecture. Why were they not called Ox-cart, or Dump-cart roads, and thus make the names artistic?

The following are more descriptions than names: Saratoga and Los Gatos Road, Alviso and San José Turnpike, and Mountain View and Alviso Road.

Bay View Schoolhouse Road is another long one. And here are some double-barrel ones: Prospect or Babb Road, Willow Extension or Settle

Road Marks on Fences, etc.—Where the fences are in sufficiently good condition, and are substantial, the road marks can be painted on galvanized sheet-iron plates, and be fastened to them. The better work of this kind is done the more satisfactory it will be, and posts of some kind are more desirable, because more permanent. See note on page 176.



GRANVILLE WAY.
The first road blocked.

Granville Way; the First Road Blocked. All the roads of Contra Costa have been officially named, and the ten-block system of numbering country houses has been adopted.

While experimenting upon the field work and determining just what was to be done, and the best way of doing it, Granville Way was measured and blocked several times by different methods. Finally, the use of a steel tape 100 feet long, for measuring, and a surveyor's field-book, in which to make the records, were decided upon as being the most exact and satisfactory way in which the work could be done, and that method was adopted.

In the records filed with the County Clerk the exact position in or within the block of the entrances, bridges, culverts, and landmarks is given. For ordinary use they are not needed, and they are here omitted.

Road Directory of Granville Way.

No. 81 in official road list: From 213 Contra Costa Highway, near the town of Walnut Creek, east to No. 92 Vista Ignacio, in Ignacio Valley. Block numbers on the road, 66—i. e., 66 numbers, 33 blocks, 3.3 miles in length.

1. E. Dunn, Walnut Creek.
3. Two-story white house—vacant.
8. Summit of small hill, and crossing of San Ramon branch of the S. P. R. R.
12. Granville .bridge over Walnut Creek.
16. Small bridge. [Creek.]
18. Mrs. Wm. Rice, about .4 m. distant.
19. Mrs. X. R. Hill, Walnut Creek.
17. San Miguel Stock Farm, about .7 m. distant, owned by Irvin Ayres, San Francisco.
20. Summit of hill. Fine view back beyond the town of Walnut Creek.
22. Manuel Welch, Walnut Creek.
26. Summit of Spring Ridge; elevation, 250 ft. Fine view of Ignacio Valley and Mount Diablo.
29. Sulphur spring, about 75 ft. back from road.
31. A. G. Gurnett, Walnut Creek.
36. Small bridge.
35. Antonio Ginocchio, about .7 m. distant, Walnut Creek.
36. E. Randall. Samuel Randall.
36. Small bridge. [Walnut Creek.]
41. H. H. Bancroft, Walnut Creek.
- 41a. Aloha Farm, .4 m. distant. Aloha Farm Nursery. A. L. Bancroft. Geo. Reed, Supt. Bert H. Bancroft, Walnut Creek.
- 41b. Crofton, 1.4 m. distant. A. L. Bancroft, Walnut Creek.
42. Pomona Road begins.
42. Small bridge.
46. F. G. Tuttle, Walnut Creek.
50. Lot Moore, Walnut Creek.
50. Interior of Ignacio Valley. Fine view of Mount Diablo and surrounding country.
59. H. P. Penniman, Walnut Creek.
66. No. 92 Vista Ignacio. End of Granville Way.

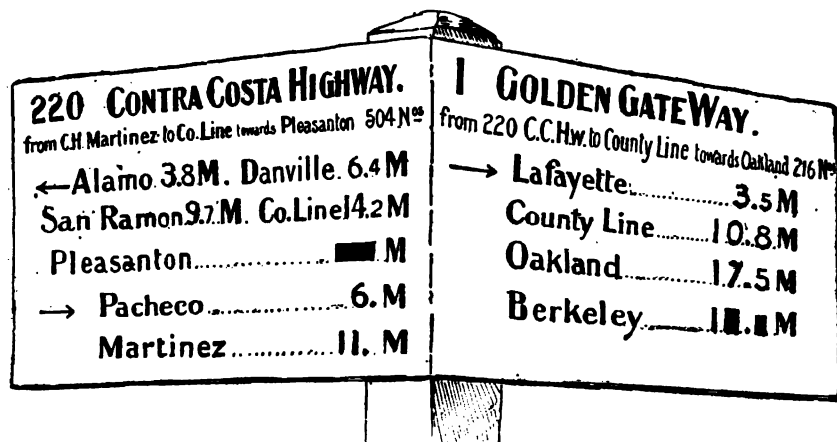
Road, and Lincoln Avenue or Mount Hamilton Road. These, however, may have been intended more for official convenience than for public use.

Measuring and Blocking the Road.—When the question of measuring was up for consideration, the first thing was an obstacle to be overcome. Where should the country road begin? Where is the dividing line between town and country? At the corporation limits? This country is new; towns grow; such a point would not be permanent; the whole structure, while it might be perfect at the outset, could not stand, but would crumble to dust. The difficulty is overcome in this way: By breaking through the frontier and going to some fixed central point and measuring from that, letting the town numbers govern within the town limits, and the country numbers commence when the limits of the town are reached; the first, and all other country numbers depending upon the distance from the starting point.

Still, keeping in mind that this is a county scheme, the county court-house, the center of county affairs, is the proper central point for the measurement to begin. Therefore, for all roads touching the county seat, the exact point where the measurement commences is the middle of the street directly in front of the main entrance to the court-house. From this point proceed by the nearest and most direct route to and out the road to be measured.

For all roads not touching the county seat, the measurement commences where the middle line of the road intersects the middle line of the road from which it departs. All roads, except locals and exits, end at the connecting road where the middle line of each form the junction.

With this system established, the town may grow into a city and take up miles of the country roads, and the remaining numbers along them will still be as applicable as they are at the commencement. Continuing the road name and road measurement directly through the



A Contra Costa Guide Board.—The first and most prominent line gives the name of the road. The figures show the number of the block in which the particular guide board is located, and enables the traveler to fix his location.

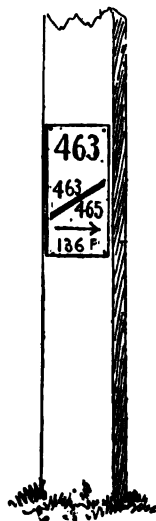
The second line shows the starting point and finish of the road, and length in block numbers. It is not intended to be legible without approaching quite near to the board.

The other lines give the information usually found upon guide boards, with the distances expressed in miles and decimals.

country towns, letting the town numbers govern within the town limits, and it completely overcomes this difficulty at these points.

Each mile is divided into ten equal parts or imaginary blocks, having frontage only—two frontages to each block—one upon each side of the road. The length of the blocks being one tenth of a mile, can also be expressed without fractions, by 528 feet, 176 yards, 32 rods, or 8 chains.

The measurement is continued uninterruptedly along the entire length of the road. Two numbers are assigned to each block, one to each frontage—the odd ones upon the left and the even ones upon the right.



On a telegraph pole.

Numbering the Country Houses and Farm Entrances.—All houses or farms having entrances upon a block bear the number of that block. Where there are more entrances than one upon the same block, which will not frequently occur, all but the first are given, in connection with the number, a distinguishing letter—982, 982a, 982b, etc. By this system, should there be an entrance every twenty feet on both sides of the road, over five hundred to the mile, a number with a letter would still be available for each one. On the other hand, if no house occurred for miles, or, if at any time afterward houses should be erected along the roads, a number would always be ready for them. Thus it will be seen the work is permanent; that new houses being built at any time upon a road will not interfere with the houses already numbered, and there is always a number ready for the new one. The only confusion that could possibly exist would be when the early houses in a block were located near the end of the block, and lettered accordingly, and the later buildings be located nearer the commencement of the block. The distinguishing letters would not then come in their regular order, and it is not absolutely necessary that they should so come; but, if revision of these letters should be considered advisable, it would be but for one block, and it would not in any way interfere with any of the others.



On a forest tree.

Guide Boards, Road Marks, and House Numbers.—As will be seen by a glance at the illustration of the guide board used in connection with this plan, while it contains all the information usually found on such aids to the stranger groping his way through the wilderness, it also contains some others.

The first and most prominent line contains the name of the road, in letters sufficiently large to be easily read some distance away. The number upon the left of the same line is not the number of the road in

Road Marks on Trees and Telegraph Poles.—Upon roads through mountainous and thinly settled parts of the country, and where distances are long and economy is necessary, iron plates, containing the road marks, can be attached to forest wayside trees, telegraph poles, and other available objects. The first line of figures gives the number of the block in which the number is posted. The following lines show just where the dividing line between this and the adjoining block comes; the direction being shown by the arrow, and the distance being given in feet.

the list of roads, but of the block within which the particular guide board is located. It will thus always be a landmark which will enable the stranger to establish his location.

The stranger, or even the local resident, knowing the name of a road, would naturally like to know something more about it. Where does the road begin, where does it end, and how long is it? The second line, in quite small letters, answers these inquiries. It is not intended to be legible from the middle of the road, but by approaching it the traveler can obtain the desired information. As the distances along the roads, under the ten-block system, are derived from the numbers—house, entrance, and block numbers all being the same—the length of the road is indicated upon the guide boards in this way, and not by expressing it in miles and fractions.

The information contained in the third and following lines is that which is ordinarily found upon country guide boards; the distances—mostly being to places not upon the same road as the one upon which the guide board is located—are given in miles, and as the whole system is a decimal one, the fractions are in tenths.

The guide boards themselves are made of galvanized iron, sufficiently thick to withstand a charge of shot from the new gun of the small boy or young hoodlum. The boards are bent at right angles, so as to be flat against two faces of the post, and the edges are turned back from the face of the board to give it rigidity. The ground of the board should be painted with luminous paint, which would enable the wording to be read at night. The posts should be of good dense 6x6 redwood, ten feet long, the part going into the ground coated with coal tar or asphaltum, and the part above the ground painted with two good coats of paint. The guide boards and numbers should be protected by ordinance of the Board of Supervisors, and by a feeling of pride and interested ownership being instilled into the hearts of children, both at home and at school, so that they would protect them the same as they would their own family or personal property of any other kind.

Along the roads—upon the fence, or other object, when suitable, and well enough preserved to warrant it—are fastened strips or sheets of galvanized boiler-iron, with marks to show the exact point of division between the blocks, with the block numbers upon either side of the marks. Three colors are uniformly used—one to indicate the mile points, a different one the half-mile points, and a third the block divisions at neither of these points. At the end of the full mile the full circle, inclosing a letter X (X, ten—ten blocks) is used. At the end of the half-mile a half circle is used; it incloses half of the X, making a V, which indicates half of the ten, or five—five blocks. Thus the story is told in several different ways, and if it is told truthfully, all should agree.

Along some roads very few objects will be found upon which it would be suitable to attach the iron plates containing the block numbers. Upon such roads trees and telegraph poles can be utilized, whether they are located exactly upon the line between two blocks or not. The number of the block in which the object is located can be given in full-size figures, and underneath smaller figures can be used to show the distance and direction to the dividing line. Of course, by going to the expense of planting posts or stone shafts especially for the purpose of supporting the numbers, they could be placed in their exact positions.

The distances being so readily and easily calculated from the block numbers, these marks answer every purpose of mile stones.

House or entrance numbers are required to be not less than three inches nor more than four inches in height, and they are recommended to be of the same material as other road marks—galvanized boiler-iron. It goes without saying that they should be neat and durable.

In England it is a universal custom to give names to the suburban and country places. It is a pleasing one, and should be encouraged. It would be appropriate to post the name of the place in connection with the house number; or the owner's name, or any business specialty in which he might be engaged, could be given. Thus the countryman would have a doorplate, or business advertisement, or a combination of the two at his entrance, which would increase his appreciation for and valuation of his home and surroundings.

Country Directories.—The roads being named and the houses numbered, a directory of the residents can be made with as much exactness and definiteness as is now possible of city people.

By limiting the words indicating town or city thoroughfares to the twelve following, viz.: alley, avenue, boulevard, court, park, place, plaza, promenade, row, square, street, and terrace—and using road, way, highway, local, connex, camino, via, drive, exit, etc., and all others for the country—a directory for an entire county, for both town and country residents, can be made under one alphabetical arrangement, and definite information can be given regarding all. For instance, if John Jones is given as 68 Contra Costa Highway, Martinez, it will be understood that he lives out on the Highway—the location being indicated by the number—and receives his mail at Martinez. If his brother, George Jones, is entered as 16 Ferry Street, Martinez, it will be known that that town is where he obtains his mail, and also that he lives in the town.

The Ten-Block System.—It will thus be seen that the ten-block system embodies the following features, viz.: Listing and naming the roads, in as long lengths as practicable; measuring and blocking them off into ten equal parts, or imaginary blocks, to each mile; assigning two numbers to each block, one to each frontage upon each side of the road. Any house having an entrance from a block has the number of its block.

The Advantages of the System.—The advantages of this system are numerous and great. Some of the more important ones are here recapitulated: The work is permanent, as much so as the roads themselves. Numbers are always ready for new houses which may be built upon a country road at any time, to any extent, without in any way disarranging the existing numbers. It is equally applicable whether the houses are twenty feet apart or twenty miles apart, and every number indicates distance. It is adapted to and useful in all kinds of country, whether flat or mountainous, and whether the roads are straight or crooked. Growing towns or new towns springing up along the line of a road do not, in the slightest degree, interfere with or disarrange the system. The measurement being continuous, and the numbers being dependent upon the distance from the starting point of the road, it matters not what part of the road is absorbed by the towns, the numbers remaining upon the country part of the road are as applicable and

useful as though the succession of the numbers was unbroken. For country distances the mile is the unit of measurement. The country-man thinks in miles. These country-house numbers indicate distances from which the miles can be calculated almost instantly. Divide the house number by two and point off one decimal, and the distance in miles and tenths is shown. In the case of odd numbers, add one to complete the block, divide by two and point off a decimal. Thus the numbers 981, and 982 opposite, both indicate 49.1 miles from the commencement of the road. With the aid of a key-map and key, taking up no more room in the pocket than a railway time-table, the distance from any house number to any other house number in a county, no matter where located, can be calculated in about one minute. Strangers can be directed and receive directions so that they can find the desired location without loss of time or asking a question.

A directory of country localities can be made which will be as full and definite as those at present published for city use; or addresses can be given in the poll list of voters, which would be useful, to some extent.

It will facilitate the official business between the county seat and the country. Road work can be more readily and accurately described. The fees of jurymen, witnesses, and county officials can be quickly calculated.

An official road register can be kept, which will direct to the book and page where all official actions taken by the Board of Supervisors pertaining to the named road can be found.

The producer of country commodities can the more readily advertise his products and find a purchaser; and the seller should be benefited thereby, while the would-be purchaser could the more easily find what he desires.

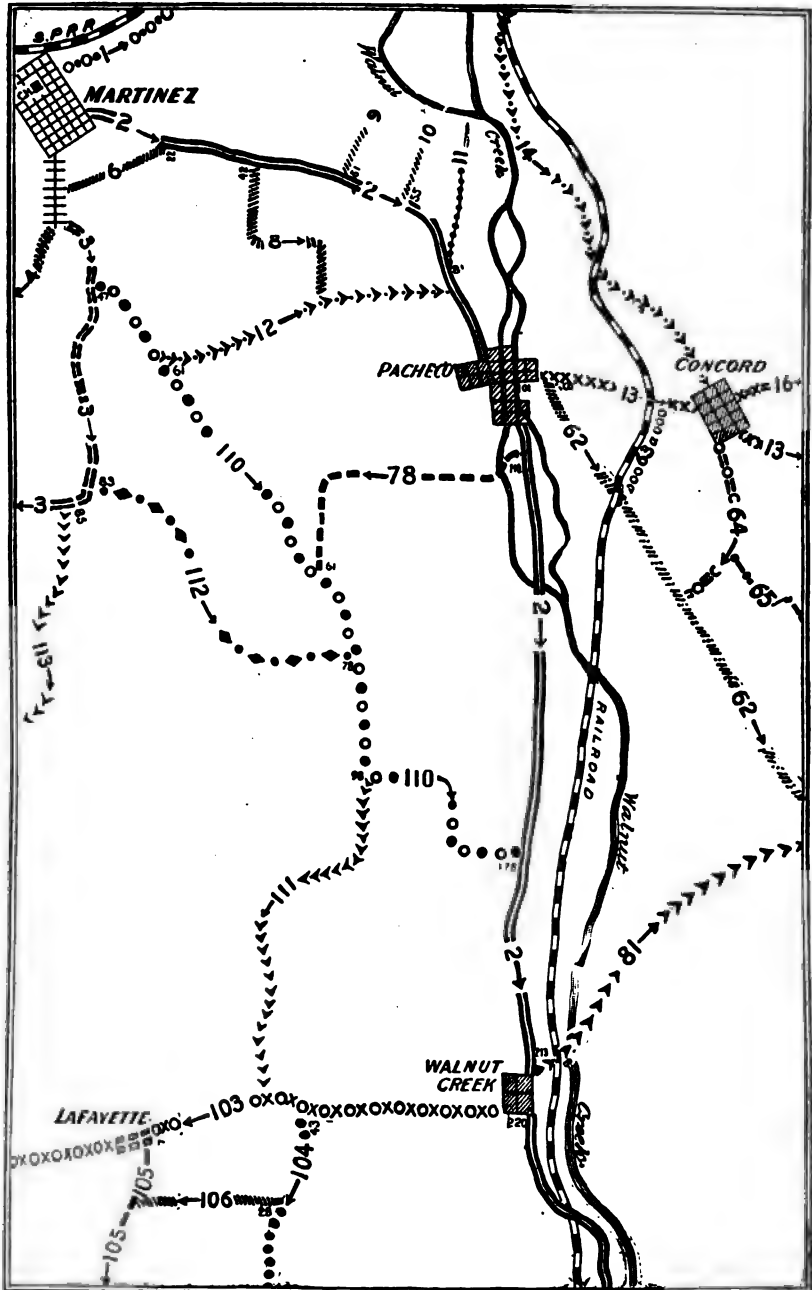
With the ten-block system in use it becomes feasible to establish mail delivery routes along the routes where they will accommodate the greatest number of people. Wayside mail boxes should be located along these roads, and be known by the name of road and number of block in which located, such as mail box 14, Ogontz Road, for instance. In these boxes could be deposited the mail, not only for the people living directly upon the roads, but also for those living within accessible distance upon either side. The boxes should have two compartments, one for the incoming mail and also one for the outgoing mail, both of which could be visited by the country postman as he passes along the roads sounding his bugle, thus giving notice to all within hearing that the postman was passing.

The influence upon the roads themselves will be important, for with people living upon named roads, and where the houses are numbered and the identity of the occupants known, the tendency will be to make a better appearance.

The intercourse between the town and country, as well as between the country people themselves, will be easier and more frequent.

As a result of all this the country will be a pleasanter place in which to live.

The Present Situation in Contra Costa.—A committee of citizens worked a year upon developing the system, shaping the system, and preparing an ordinance. It was upon the basis that the expense should



A TEN-BLOCK SYSTEM ROAD MAP
Of the Central Portion of Contra Costa County.
(See opposite page for key and explanation.)

A TEN-BLOCK SYSTEM ROAD MAP.

The map on the page opposite shows the principal roads of the central part of Contra Costa County.

By means of the different characters used to represent the connecting roads, each road as named and mapped can be seen at a glance. The heavy figures in the line of the road give the number of the road in the official road list, while the small figures at right angles to the road show the block, or house or entrance numbers upon the road. Distances can be almost instantly calculated from the block numbers.

The following table gives the names and numbers of the roads shown on the map. All roads touching Martinez, the county seat, are measured from the court-house. Notice with what exactness the roads can be described :

Road List No.	Name.	Begins at	General Course.	Ends at	Block Nos. on Road.
1	Alpha Way				
2	Contra Costa Highway	Court House, Martinez	S. E.	Co. line tow'd Pleasanton	504
3	Alhambra Way	Court House, Martinez	W.	225 Franklin Road	316
4	Franklin Road	34 Alhambra Way	W.	Co. line tow'd W. Berkeley	428
5	Vista Rio	Court House, Martinez		Franklin Road, near Pinedale	
6	Hillsdale Local	22 Contra Costa Highway	S. E.	Hillsdale	8
8	Morello Connex	42 Contra Costa Highway		Vine Hill Way	
9	Teal Local	55 Contra Costa Highway			
10	Tule Road	Contra Costa Highway		Solano Way	
11	Pacheco Exit	81 Contra Costa Highway		Pacheco Landing	
12	Vine Hill Way	84 Contra Costa Highway		Locust Way	
13	Camino Diablo	101 Contra Costa Highway	S. E.		
14	Solano Way	Camino Diablo		Avon Station	
16	Willow Pass Road	39 Camino Diablo	E.		
62	Vista Ignacio	8 Camino Diablo	S.	Co. line toward Tracy	
63	Valley Center Local	78 Vista Ignacio	S. W.	Gove's	10
63a	Ogonts Road	30 Camino Diablo	S.	25 Vista Ignacio	20
64	Concord Lateral	36 Camino Diablo	S.	43 Vista Ignacio	36
65	Via Concordia	23 Concord Lateral	S. E.	44 Lime Ridge Crossing	82
66	Lime Ridge Crossing	68 Camino Diablo	S.	73 Vista Ignacio	60
78	Paso Nogal	110 Contra Costa Highway	S.	61 Locust Way	52
81	Granville Way	213 Contra Costa Highway	E.	92 Vista Ignacio	66
85	Kent Road	293 Contra Costa Highway	E.		
103	Golden Gate Way	220 C. H. way at Wal. Ck.	W.	Co. line toward Oakland	216
104	Walnut Way	43 Golden Gate Way	S.	77 La Grange Road	104
105	La Grange Road	71 Golden Gate Way	S.		
106	Garden Connex	9 La Grange Road	E.	28 Walnut Way	28
110	Locust Way	47 Alhambra Way	S. E.	178 Contra Costa Highway	180
111	Pleasant Hill Road	Locust Way		Golden Gate Way	
112	Sara Connex	83 Alhambra Way	S. E.	78 Locust Way	64
113	Briones Road	Alhambra Way		Golden Gate Way	

POINTS OF INTEREST ALONG SOME OF THE ROADS.

2, CONTRA COSTA HIGHWAY. 1, Court-house, Martinez. 14, Boundary of the town of Martinez. 22, Hillsdale Local. 42, Morello Connex begins. 50, Vine Hill school. 55, Teal Local. 60-62, Mosquito Bend. 74, Mount Diablo comes into view. 81, Pacheco Exit. 84, Vine Hill Way begins. 100, Town of Pacheco. 101, Camino Diablo begins. 110, Paso Nogal begins. —, Crofton Way begins, leading to Hookston Station, S. P. R. R. 178, Locust Way ends. 186, Summit of hill; fine view of Ignacio Valley and Mount Diablo. 195, Mrs. Felipa Welch. 213, Granville Way begins. 220, Town of Walnut Creek. 220, Golden Gate Way begins. 248, Starr King Road begins. 250, Crossing San Ramon Branch S. P. R. R. 275, Ramon Road begins. 293, Kent Road begins. 298, Town of Alamo. 306, Hemme Station, S. P. R. R. 347, Camino Tassajara begins. 350, Town of Danville. 356, Crossing San Ramon Branch S. P. R. R. 414, Harper Way begins. 414, Bridge over San Ramon Creek. 414, Town of San Ramon. 415, Fostoria Way begins. 428, Stanley Road begins. 504, County line; end of Contra Costa Highway. To Pleasanton, — miles.

81, GRANVILLE WAY. 1, No. 213 Contra Costa Highway, at the town of Walnut Creek. 8, Crossing San Ramon Branch S. P. R. R. 12, Granville Bridge over Walnut Creek. 20, Fine view back beyond the town of Walnut Creek. 28, Summit of Spring Ridge; fine view of Mount Diablo and Ignacio Valley. 44, Pomona Road begins. 50, Interior of Ignacio Valley; fine view of Mount Diablo and surrounding country. 66, No. 92 Vista Ignacio, near Oak Grove school; end of Granville Way.

103, GOLDEN GATE WAY. 1, No. 220 Contra Costa Highway. 1, Town of Walnut Creek. 43, Walnut Way begins. 49, Lafayette Cemetery. 50, Pleasant Hill Road ends. 70, Town of Lafayette. 71, La Grange Road begins. 91, Road not named (?). 110, Bridge. 110, Briones Road ends. 130, Summit of Charles Hill. 152, Crossing California and Nevada Railroad. 152, Camino Pablo crossing. 175, Laurel Connex begins. 177, — (Fish Ranch). 216, County line; summit of ridge; fine view of the Golden Gate, Farallon Islands, San Francisco, part of Oakland, etc. To Oakland court-house, — miles.

be paid out of the public treasury. It did not pass. Six months later it was presented again, upon the basis that the measuring and blocking-off of the roads be done at private expense, and when, or as, so done the county would, at public expense, erect and maintain suitable guide boards. With this modification the ordinance was passed, and the roads are now all named. Enough money has been pledged to establish the system over a few hundred miles of roads in the central part of the county, and work upon it has already been commenced.

A permanent committee of three citizens is charged with the duty of proposing names for new roads, seeing that the field work is properly done, etc. It is hoped that after the work done at private expense shall have been in actual use for a time, that the Board of Supervisors will order the remaining part of the county completed at public expense.

Establishing the System.—While the ten-block system is an interesting theory with which to tickle the imagination, there is but little doubt that it will be found even more pleasing and useful in active operation.

Although the originator of this scheme could not, at the outset, see any fatal defects in it, for the first six months or a year that it was before the public he did not have entire confidence that others might not consider it of no value. Now that it has passed under the scrutiny of so many writers and interested people without serious defects having been pointed out, he is becoming more confident, and feels that it is a plan that is safe to put into actual operation generally—the more extensively the better.

In order to establish it committee work is required, and a few good men should be found to undertake the service. It will require good, interested, persistent work. The committee must be brought into existence by the powers that be—the Board of Supervisors—or emanate from the people.

Unless the Supervisors would be willing to appoint such a committee at the outset, one public meeting, well planned in advance—to which all interested should be invited, where the subject would be discussed—should be sufficient. At such a meeting a committee could be elected, with powers to fill vacancies, or even to add to their numbers, and take all action necessary to give the movement shape, and present it to the Board of Supervisors for their action. A committee of five would be large enough, and then the most of the work would probably be done by two or three of their number.

This is a public work, and should be done at public expense; and the Board of Supervisors should be asked to order it so done, and for their entire county.

In Contra Costa the first meetings were held two and a half years ago, in Oak Grove school-house, in Ignacio Valley, at the base of Mount Diablo. Following the meetings in this school-house others were held in other school districts, and then two others were held at Martinez, the county seat. At the latter of these the whole matter was referred to a permanent committee of five, with power to act, and they now have something to show for the time spent upon it.

The work in the field of putting the system into actual operation has not been touched upon in this paper, but as sister counties arrive at that point they can count upon all the assistance that the pioneer work which is being done by Contra Costa will enable her to give.

FUTURE PRODUCTION OF FRUIT.

MR. GORDON: I have no doubt that General Chipman's ideas as to wheat growing in the northern part of the State are well founded, but it seems to me his ideas as to fruit growing are not so well founded. The idea that the market for green fruit is unlimited is not sustained by the facts; and the idea that we should continue planting oranges in the way we have been for the last five years, seems to me a most fatal error. Take, for instance, our prune product, the principal product of this valley. Give me the portion of the Santa Clara Valley that is capable of producing a good prune, and I will guarantee to supply the entire consumption of the world in the next ten years. As a matter of fact, there are to-day more prune trees planted in the State of California than the product of which can possibly be consumed. The prunes that are to-day growing will produce—at an estimate of only one hundred pounds per tree, which certainly is a small one, if we can believe the reports—a considerable over 200,000,000 pounds in less than five years. Surely, is it not time to call a halt in this wild planting of prunes?

MR. BERWICK: I believe in the fruit business and I do not believe in the wheat business, but I believe that both sides of the question should be fully stated. We want a campaign of education in fruit growing and fruit eating as well. General Chipman spoke of a family eating 75 pounds per capita per annum. The Berwick family consumes 365 pounds per capita per annum, and I hope there will be a time coming when you will all be equally hearty with the Berwick family. Gentlemen, I believe in hygiene, and one great part of hygiene is good diet. I think that there is as much money spent to-day for patent medicines as there is for prunes, and I had rather spend the money for prunes than dose myself with patent medicine.

MR. MASLIN: I represent the State Board of Trade. I have had a number of intelligent inquiries from the East, and I am very glad to hear the discussion on that question. Now, I think it is like the old fable of looking at two sides of a shield. When I read the papers I find that in Tulare a man takes off from a tree 1,100 pounds of prunes, which is absolutely amazing; such statements do damage to California; then I go to another man who has an acre of prunes, as I know of some in my own county, who has planted prunes on the wrong soil, and in the course of four or five years the prune orchard is destroyed. As Mr. McWilliams says, every industry has a scale insect. You have got to get the right man on the right soil with the right climate to produce the right kind of fruit. There is a very large percentage of men who are not the right men, who are cultivating fruit, and it requires skill, courage, patience, learning, observation, and perseverance for them to become successful fruit raisers. Now, I believe that General Chipman's statement as to the value of the production of an acre of fruit is not very largely overdrawn, for in 1880 we shipped about 5,000,000 pounds of fruit, and last year we shipped 323,000,000 pounds of green deciduous fruits, excluding dried fruits, raisins, and nuts. Is it possible, Mr. President, that a community of intelligent people will go on for ten years and produce from 5,000,000 pounds of fruit, exclusive of domestic production, up to 323,000,000 pounds, if it is an unprofitable venture? There was a gentleman named A. G. Seale, who wrote from San José to London. He said he had worked in every valley in the State of California, and

he pronounced the fruit of California to be a humbug, fruit producers bankrupt, and the whole thing overdone; and he said a young man from Oxford and Eton, of good constitution, could scarcely obtain a living in California. I undertook to answer that letter, and took fifteen of the leading fruit counties of this State, and the assessment of the property, outside of the improvements, on the naked land as it was directly assessed, was \$70,000,000. In 1890, these identical fifteen counties, or the identical land, exclusive of town lots, was assessed at \$204,000,000. Why, Mr. President, if an Assessor should assess land two or three times higher—unless the valuation was based on the productive capacity of the land—he would be hung; and the owner only submits to it because the value is in the land. I have hundreds of inquiries from the East as to land, but the people there have an idea you ask too much for your land. I am sure \$300 or \$400 an acre for land is not too high, because I believe that expert fruit men do raise generally from \$150 to \$200 per acre upon the land. We are not telling a lie to the people of the United States when we do say that it is profitable.

Recess.

XVI.

EVENING SESSION.

President COOPER in the chair.

FLORA AND FOREST CULTURE.

HERBACEOUS PERENNIALS.

By MRS. SARAH P. COOPER, of Santa Barbara.

The merits of annuals and bulbous plants in ornamental gardening having been the subject of successive papers at previous meetings, we would now like to invite your attention to the worth of herbaceous perennials. These, as the term indicates, have no woody fibers; the stems of most of them, after producing their flowers and ripening their seeds, die down to the ground; while the roots, retaining their vitality, send up shoots at their regular seasons of growth, and continue to do so for an indefinite number of years. Thus, so far as this class of flowering plants is concerned, the garden, when they are well established, is made for all time to come.

So great has been the demand for herbaceous perennials during the past years that to the lists of old favorites many desirable new ones have been added. New introductions and new hybrids have increased the number to such an extent, embracing in their reach a diversity of plants alike in color, so that different gardens in one neighborhood can be made to show a pleasing variety, thereby avoiding that sameness in decorative gardening so much objected to at the present time.

Beginning with blue, there is nothing finer than *Delphiniums*, *Salvia patens*, *Campanula carpatica*, *Commelyna caeleste*, and the blue Gentians.

In yellows: *Coreopsis lanceolata*, *Linum flavum*, *Alyssum saxatile*, *Hypericum elegans*, *Papaver nudicaule*, *Helianthus Japonicus*, and Wall-flowers.

In pink: *Pyrrethrum Benedict*, *Hibiscus Moscheutos*, *Oenothera rosea*, Hollyhocks, pink Carnations, *Anemone Japonica*, and pink Stock.

The purples are: Petunias, *Pentstemon spectabilis*, *Salvia purpurea*, *Liatris spicata*, and Heliotrope.

In orange, the list is not so large. *Asclepias tuberosa*, *Papaver nudicaule*, and the *Leonotis leonurus* are very desirable.

Of whites and reds the catalogues are so full of varieties familiar to every one that there is no need to enumerate them here.

Much care is needed in the placing of these herbaceous perennials to have their full effect, especially the wild ones we are "accustomed to see among rocks and shrubs in woods and thickets." High-growing plants with showy colors should be placed against a background of dark green shrubbery; while the more delicate ones must be planted among open shrubs, that they may have protection from the too strong rays of the sun and from violent currents of wind. The moisture-loving ones should have their situation where they can be readily watered. Small plants, and there are many gems among them, should find safety in a rockery, and this should have a light shade from the afternoon sun. Some of the light, graceful acacias, the *Washington filifera*, when sufficiently grown, the beautiful *Parkinsonia aculeata*, afford the right kind of protection for these delicate things.

California is favorable, on account of its rich soil, to fine growths of sedges, grasses, bamboos, and such like things. And in a late number of "Garden and Forest" one of the writers in that most valuable periodical calls attention to the use that might be made of these plants in ornamental gardening.

The droids can be made to produce fine effects along with liliaceous plants, as *Tritomas*, *Clinums*, *Pancratiums*, *Aspidistra lurida*, *Phormiums*, *Hemerocallis*, and some of the tall-growing irises.

There is a class of plants—the *Crassulas*—that are somewhat difficult to manage to good effect: *Echeverias*, *Cotyledons*, *Sedums*, *Sempervivums*, *Crassulas*, *Rochea falcata*. The large-growing ones can be used individually to good purpose, but as a rule they do not go well in groups. Clumps of *Echeveria metallica* make fine showing in the winter months, with their shrimp-colored stems and flowers. The smaller ones among rocks might do better treated as the cacti are.

The cacti—green, fleshy, thickened persistent, mostly leafless plants of peculiar aspect, as described by their authority, Dr. George Engelmann—are most interesting. There should be a corner in every garden for a collection of them. Their many and curious forms, the gorgeous coloring of their flowers, the night-blooming habit of some, many of them covered with tubercles, which, according to botanical authority, represent arrested buds, all conspire to make them, as a class, one most curiously interesting to study. Great interest is taken in them at the present time, and they bid fair, as a group, to become one of the fashionable plants among amateur gardeners. They are mentioned in this place, although they do not properly belong among herbaceous plants. They are described by some botanists as shrubs, and yet they do not seem like shrubs, but from their soft, succulent structure, are somewhat like herbaceous plants, and so I have put them in this paper.

The study of vegetable life in its varied forms has important interests for all, because as a study it is many-sided; to the merchant, for the marketable value of its products; to scientists, for the aid it brings him in understanding the general law of things; to the artist, that he may the better comprehend the relation of all beauty, and to the general gardener, for the pleasure and delight it brings, and for the freedom it gives from the burden of harassing cares and wearisome thoughts.

THE FUTURE OF FLORICULTURE IN CALIFORNIA.

Some Personal Experiences, Etc.

By MRS. THEODORIS B. SHEPARD, of Santa Barbara.

"I am certain that California before fifty years will be the great seed and bulb-growing country of the world. You have the exact conditions of climate necessary to grow seeds, and I would advise you to at once begin systematically."

These words, fraught with so much meaning, came to me ten years ago from the pen of the eminent horticulturist—Peter Henderson, of New York. Although I knew from limited experience that California soil and climate afforded the best conditions, I had not yet realized the possibilities of the growth of flower seeds and bulbs as an industry.

Like all flower lovers and collectors, I wished all the new and beautiful novelties offered; but novelties and choice things cost money, and my funds were limited. My first thoughts were to make the bulbs and seeds that ripened in my garden, and the surplus bulbs of my neighbors with whom I exchanged, the means of gratifying my taste for flowers; but it at last began to dawn upon me that there was a demand for much that could be supplied in California, and the words of Peter Henderson returned to me repeatedly. After two years of exchanging, my collection outgrew my ground. Adjoining our place was a two-acre lot, which I, after some coaxing, persuaded my husband to buy. It sloped gently southward from the high foothills to the sea. My husband had in *his* mind's eye an orchard on the lot, and purchased some choice trees, which were duly planted. A handsome residence and a fine lawn were to occupy the front, and I was given the privilege of growing whatever I chose on the ground in the meantime. But *I* saw a seed and bulb garden in *my* mind's eye on that two-acre lot. It is not necessary to observe that the trees vanished one by one. It was necessary that they should, to make room for lath-houses, green-houses, bulb and seed beds. Finally other ground was taken, and a variety of stock was grown and considerable space occupied, and to all appearances a business was established in a small way. I was not a business person. In all that goes to make a success in business I was decidedly amateurish. I attempted the difficult work of doing a retail and wholesale business. My collection was large and constantly increasing in variety and quantity. I got out my first catalogue of seeds, bulbs, and plants six years ago, and my first wholesale list five years since. Since then I have published three other catalogues and wholesale lists. I had difficulties to meet, chief of which were lack of capital, lack of experience, lack of knowledge of what to grow, and what prices to ask. I could not advertise, because I had no means with

which to do so, and did not know how if I had. Indeed, I do not know now. How to advertise has been one of the most difficult branches of my work. If indulgent friends interested in woman's work had not written me up from time to time, often alluding to me as the "pioneer seed grower of California," I fear my business would not for a long time have received the impetus essential to success. I found that any staple article I could raise in which there was no risk to the buyer I could readily dispose of, but of choice sorts in which there was risk, they were very shy, and informed me many times that they supplied themselves in Europe. Fortunately, I have never been easily discouraged. I knew the good qualities of California-grown bulbs and seeds, that none better could be produced, and felt positive that by perseverance in growing first-class seeds, and persistently offering them, I would at last convince the skeptical Eastern dealers that they *did want* California stock. I made many mistakes, and sometimes my heart sank within me. There was no one of whom I could ask advice, for none knew better than I. My husband and family and friends for a long time, though they threw no obstacle in my path, seriously objected to my working so hard, and going into business, and rather discouraged my ambitions, but when women are irrepressible, their friends generally come round in time, and so in my case. They finally ceased to dampen my enthusiasm with doubts of my ability to succeed, and became firm allies.

I am fully convinced that what "Peter the Great," in horticulture, expressed so long as ten years ago, is true. California will, in the very near future, be the great seed and bulb-producing country of the world, and be the great nursery of the world as well. Great flower farms for perfume will dot the hills and valleys; immense nurseries for growing choice and rare palms trees, shrubs and bulbs for export; wonderful plantations of the stately giant bamboo for manufacturing purposes—all these and many more. No State has so great a future; no State can supply so great a demand, as this our California, with its wonderful possibilities, truly the Golden State. All the gold, and more than has ever been taken from her bosom, will be poured into her lap again, in exchange for the valuable products that grow in her rich soil. Floriculture, once an infant, has long outgrown its swaddling clothes. I well remember hearing men say, "Oh, flowers; there is no money in them. They are all very well in their place, but give me potatoes, beets, and cabbages; they are worth something, they are good to eat." Now, no one denies the commercial value of flowers. They are staple articles. Once they graced our grandmother's gardens, or were the privilege of the wealthy few, or were occasionally used here and there for a wedding or a funeral; now no house is complete without its garden, no entertainment considered a success unless flowers are used as decorations. The æsthetic taste of the people demands beauty. Their homes, their weddings, funerals, entertainments, their persons, must be adorned with flowers.

Flower culture is a work for which women are preëminently fitted. There is scarcely a branch in which an intelligent, energetic woman with any love for the work could not succeed, if she has self-reliance and determination. The varieties of stock that can be grown and are in demand are innumerable. There are staple articles always called for. Novelties are eagerly sought, and often small fortunes made on one new bulb or plant. A novelty in plants is often like a new song which strikes

the right chord and every one sings it; it strikes the popular taste, and every one must have it. Novelties are either sprouts or from seed. If from seed they are the result of natural or artificial fertilization.

Among the many attractions of my garden two years ago was a bed of very beautiful and choice petunias. Not the little magenta-colored plebeians of our childhood, but very aristocratic petunias with high-sounding names, such as *Petunia hybrida grandiflora*; Prince and Princess of Wurtemberg, etc. Every plant in the bed had been raised from the choicest seeds to be had in the country, but the most beautiful of all were some single and double fringed ones raised from seeds of my own hybridizing on a lovely foreign strain. I spent many hours cross-fertilizing the flowers for seed. One morning, when thus employed, a flower-loving friend, Mrs. Gould, who also had some very fine petunias, paid the flowers a visit. She begged me to teach her how to fertilize a flower, and after I had shown her the simple process, she suggested that we should exchange flowers for cross-fertilizing and hybridizing. We frequently met among the petunias during the summer, discussed their possibilities, and planned for their improvement. One day I proposed to Mrs. Gould that as she was such a lover of this valuable bedding plant she make a specialty of it, and see what she could do with it by intelligent work. Her thoughtful "I believe I will" meant a good deal, for the following season she brought me some specimen petunias, the result of her first efforts. There were fifteen or twenty flowers, no two alike, all perfect in form and color and giants in size. Their pictures were taken and sent East; letters of commendation, descriptive and introductory, followed. After they reached New York they were christened "The Giants of California," and the next season their pictures, life size and life-like colors, ornamented the outside cover of a catalogue of one of the largest seed merchants in the country. Now our little Ventura specialist (of whom we are all very proud) has orders for all she can grow. She is still at work hybridizing, and operates skillfully and with unabated enthusiasm. She knows the pedigree of every new petunia that blossoms in her garden, and works for a purpose with ever flower she crosses.

Mrs. Gould's success shows what any woman, with enthusiasm, intelligence, patience, and determination can accomplish. "The elements of success are in the individual," and as Emerson says, "Nature is thoroughly meditate. It is made to serve. It offers all its kingdom to man as the raw material, which he may mold into what is useful. Man is never weary of working it up. He forges the subtle air into wise and melodious words, and gives them wing as angels of persuasion and command. More and more with every thought does his kingdom stretch over things, until the world becomes at last only a realized will, the double of the man."

A WOMAN'S ORCHARD.

By MRS. GEORGIE MCBRIDE, of San José.

Some one has said that "woman is the greatest discovery of the age." The next greatest is the discovery of the opportunities afforded her in all the walks of life—to become independent; and in no quarter of the globe can she grasp them so thoroughly and successfully as in our own beautiful

State; nor can she find any occupation more remunerative than horticulture. It has been one of the latest fields of labor opened to women, and too little is known by them of its possibilities. In this utilitarian age, when most women are striving to be financially independent, there is no avenue thereto replete with such pecuniary results as horticulture; and, as all trades and commerce depend on the products of the soil for their foundation, the incentive to produce good work is great, as the returns are sure and profitable. She must not scorn to lay hold with her hands. In the orchard, as in other pursuits, there is no royal road to wealth—toil is the price of success.

She can engage in this work without loss of delicacy, grace, or refinement; it gives her an insight into business, and strengthens mind as well as body. If, as is often the case, she has children dependent on her for support, she can have their assistance in her work, and by precept and example, elevate their thoughts and ambitions to a sphere where they will not be subjected to the strong tide of temptation which surrounds them in the cities, and often bears them away beneath the flood.

Some twelve years ago a lady from the East came to this beautiful valley, seeking to make a home for herself and four little boys among its hospitable people. The fruit industry was beginning to attract attention, and she invested in fifteen acres of stubble land in "The Willows," and proceeded to put out an orchard. She was undecided what varieties to plant, but was assured that *everything* paid; that egg plums were bringing 6 cents per pound; that there could never be enough black cherries to supply the market; that this was one of the few favored regions that grew the apricot; that some growers had made \$500 per acre on peaches, and so on through the whole list of fruits. By the time her egg plums were in bearing they were a drug in the market, and were replaced with French prunes. Apricots were mostly of the Moorpark varieties, and, as all know, are shy bearers, but they have yielded as fresh fruit \$400 per acre. The peaches were badly affected with curled leaf, and have also been removed; some good varieties have yielded \$5 per tree. The black cherries have made a fine growth, but have never borne full crops, except where near some white varieties; they have yielded \$300 per acre. Pears and apples were also planted, but owing to ravages of scale and codlin moth, have long since been replaced by French prunes, and at this time the orchard is composed almost entirely of that variety of fruit. She thought when she had paid for land and trees and planted the orchard, that most of the labor and expense were over until the harvest could be expected, but she found the work was just begun.

The soil proved to be excellent, and the trees grew satisfactorily, but she found that young trees, like children, need both watchful care and pruning; and while her boys were at school she toiled unceasingly for the rich returns she was assured were just within her grasp. Enthusiastic friends told marvelous tales of some one else's profits on fruit; she was assured that within three years, at most, she would have more money than she would know what to do with; could rest her weary form in a patent rocker, and have a capable heathen in the kitchen. So she hoed, and dug, and pruned, and lived on hope—which proved a good calculator, but a poor mathematician, as the aforesaid luxuries are still in prospective.

Like others in the business, she made many mistakes; but whenever

she threw to the breeze her signals of ignorant distress kind neighbors and friends came to her relief, and with advice and assistance put her on the right track again. She prospered so well that she was encouraged to add twenty additional acres to her original purchase. Having raised her own help, she was independent of the unskilled Chinaman, and had willing assistance from her four boys, the oldest of whom was not fifteen years of age.

Insect pests were doing their greatest damage about this time, and the first year of planting the destructive *Diabrotica* was only prevented from destroying her trees by the strictest vigilance, one neighbor losing one thousand six hundred by their ravages. She was well nigh discouraged, but a sympathetic friend bade her hope on, and not give up, as there was "a bug in every business."

While she found the work in the orchard laborious, it was also healthful and fascinating, and if she did have to rise with the lark, she could go to bed with the sun. A meeting with a neighbor always brought up a discussion on fruit, its probable yields and results were figured up, and everybody got rich—on paper.

The fourth year her orchard began to yield some fruit, and then her troubles began. Not being prepared to dry her own products she was forced to sell them green. A buyer would make an offer for fruit, good for that day only, as he had within a few tons of all he wanted, and the market was falling. If she suggested that the crop was light and should command a better price, he would say that the shortage was only in her immediate neighborhood, that in other portions of the county and State the crop was unusually heavy, the trees were literally breaking down, and so on. On the unsophisticated this information would be likely to produce a panic, and a sale was often made upon such representations. If she had backbone enough to hold out for a higher figure, he would probably return in a few days with the statement that he had received later advices, a telegram from Persia, may be, and from the Shah, of course, enabling him to offer a slight advance on former prices, but had now reached the limit; that he would not think of giving such figures, only that he knew where he could dispose of a few tons at prices that would justify it.

A few such experiences as this were calculated to break a poor woman all up, so she decided to make the necessary preparations and dry her own fruit. And every grower knows what this means. It is the end of panics and uncertain prices, for dried fruit is as good as money in bank.

And now she made a discovery: She had been selling her green prunes on a basis of three pounds for one. She found by experience that it did not take more than two and one half pounds for one, and some exceptional years not so much. She was also told that she could not have them too dry. She found that when all the moisture was extracted, they went in a lower grade, and she not only lost in weight, but in size also. Now she finishes the curing by keeping the trays covered, and gets all there is in them.

Experience has taught her that to dry her fruit for market is the most profitable way of disposing of it. While 3 cents per pound is a big price for green prunes, it is not more than 8 cents for the dried, and when they do sell for \$60 per ton green, they are always easily disposed of at 10 cents per pound or more dried, as they are as much a staple as wheat or wool.

Selling to the canners has proved unsatisfactory. They, of course, want only the best fruit, but have been known to reject that on some trivial pretext, if they found they had contracted for more than they were likely to dispose of.

Shipping green fruit to the San Francisco market she found to be still worse, as no matter how fine the fruit she always got the lowest quotations.

She is entirely satisfied with her venture in the fruit business, and does not know where in the State she could better her situation for that pursuit, unless she should try San Diego County, where she has heard there are millions of acres of orange land, of unheard-of fertility, awaiting an investor, and where they raise oranges on both root and branch. She is only one of many ladies engaged in this work who take an interest in it and do it well. A widow in this business is not known by her weeds.

HOME ADORNMENTS.

By MRS. MAGGIE DOWNING BRAINARD, of San José.

This subject, in the ordinary sense of the term, has been crocheted, painted, and bric-a-bracked threadbare. In the popular gewgaws in which a giddy fashion has enveloped it, its genuine beauty and true value are lost under the idea that it is found only in the depths of wall pockets and under the folds of slumber rugs.

Home adornment begins with and lies principally in its living, breathing occupants. Its most valued jewels are the souls of these inmates, and their gilded settings or spotless wreaths of fresco work emanate from the love and warmth of sincerity found in generous hearts. Man is susceptible to an absolute change in his nature by his daily surroundings. He is as much a creature of habit as of reason. Home influences, therefore, go more to make up his character than any other direct impression.

Every child is born with some peculiar characteristic, and home adornment has just as much to do with the stifling or the expanding of that bud of genius as an academic education.

For instance, if the strongest proclivities of that nature lead to conquest, nothing will help the young mind to study out its problems better than the "Battle Scene," traced by mother's fingers on canvas in paint or tapestry, and framed on the pure white wall. A group of stuffed birds upon the mantel, and near by, in all good faith, a cunning squirrel eating a nut, a case of butterflies and another of bugs, sharpens ornithology and its kindred science in the mind that bends in that direction. Delicate wild flowers, pressed and tastefully combined with shading grasses, the young botanist views with daily delights. The chemist is struck with curious interest as he puzzles over a bunch of snowy phantom leaves and seed pods, deftly wound about a black velvet cross, and racks his young brain to know the secret by which the dead matter is carried off and the fairy lace work left intact. The poet and the novelist form ideals of grace and luxury from soft cushions and filmy scarfs that adorn each settee, chair, or picture; and the genius of invention, set to work by a close inspection of hand-made bric-a-brac, develops at once into a baby marvel of the mechanical world.

Each object thus taken, especially from the kingdom of nature, as home ornament, implants a lesson in the seed garden of the heart, that blooms and bears fruit upon the pages of history, biography, and romance in every tongue and under every clime.

Growing minds are not the only ones thus impressed, neither are the intellectual parts of the individual all that bear the signet. The passions, as well as the spirits, come in for a goodly share. Tell one this ordinarily, and he will deny it. He has never become aware of the fact, that is all. Pick for yourself, from the world, a specimen whose home adornments, in every shape, form, or fashion, are lacking. The curtains at the window hang in stiff folds; the great, bare walls loom up like phantom shadows, and the stiff-backed chairs, devoid of little ribbons, laces, or soft, clinging zephyrs, seem at "drawn daggers" with you, as well as the whole community. Before you know it, no matter how congenial you may be by nature, you return the madam's bow as cold and formal as her own. You seat yourself with an uneasy feeling, and a queer, dissatisfied air creeps over you. The fire burns, but the hearth looks cold; the lamp shines keen, cutting, sharp. Presently the old grandmother hobbles in, querulous and crotchety. She seats herself with the same uncomfortable air pervading the house, and as the children gather in a rude, noisy group about her, and she pulls her knitting from her pocket, one little one eagerly says, "Now, gran'ma, tell us somethin' 'bout your neighbors." The secret is divulged. *Gossip holds sway in that household*, and home adornments, despised as useless tawdry, have no power to checkmate the devil's greatest emissary. Man is not, by nature, depraved. But his mind, soul, or whatever you may call the infinite part of him, is so organized or formed as to need, whether he sleeps or wakes, constant feeding; and whatever is at hand the most convenient for the flame is consumed—if not fair, it must be foul—the body is fed by the flame. If the fire feeds upon the tainted it must necessarily become a putrid mass, and the earlier it becomes so the denser the corruption.

Home adornments, if judiciously selected or made, bear, on balmy wings of purest whiteness, peace and rest to mind and body. A great historian once said the way he rested from his arduous work was to lie down and read the "trashiest" novel he could find, the idea conveyed being a diving into exactly the opposite field. So the horticulturist, whose fields are laden with luscious fruits of purple and gold, and where fairies hold revels in the perfumed flower-beds about his doors, should adorn his home with scenery, mechanisms, symbols, and beauties found in busy cities, upon the high seas, or in the mines of the earth. In these he will find a wondrous pleasure, as he turns for a moment from the outward scene. The citizen, however, denied God's fairest boons—in green grass and blushing flowers, in mirrored lakes and balmy skies, in sun-kissed mountain vineyards and laden, golden-crowned orchards—must paint his walls with these, and deck his mantels and bric-a-brac with their fairest imitations. To him the inward contrast, as he leaves his counting-room and seeks his home, will be an earthly paradise, 'mid living angels flitting near.

Man's first home was adorned with every natural beauty that could be devised by the Godhead himself. The original idea of a certain divine, that "Adam was made of mud and set against the fence by the roadside to dry," has long since exploded, even in the originator's mind.

Bearing the impress of the Deity in his being, one of the most beautiful thoughts of all comes to our mind of what was contained in that open book, laid in his hands to read, when man became a living, breathing creature. *Every lesson was written in adornments—home adornments.* Life and Death were painted there; the dew sweats of sorrow and the rippling laughter of joy bathed flower petals in shadows, or tipped them with sunshine and waited in innocent ignorance to follow the future fugitive into exile. The warbling birds and sunny skies, the sparkling waters and balmy air, breathed still of heaven in the presence of the Maker, and gave a lingering tenderness and pride to the finishing touches of His creations. The wondrous power given to leaf and bud for development directly under the human eye, and yet, although the change was radical, no perception could detect it.

Wrapped in the mystic workings of the leaf, veins rolling over veins and tissues lacing and interlacing, breathing, growing, living, dying, are the mysterious, unfathomed workings of the *human* heart. Science cannot unravel the secret, neither can the man himself solve the puzzle, although his breast holds the problem, and the end is with him—life or eternal death.

The tree, the bearing tree, with its fruits and its flowers, and its silent growth of leaf, bud, and limb, is a link between the long, unseen corridors of the soul of man and the merciful face of his maker; through it was death, through it redemption—the only pleasure and greatest beauty left him from his Paradise Lost, and the most *grateful*, as well as useful and beautiful of home adornments.

DISCUSSION OF PAPERS.

MRS. MATTIE S. JONES, of Yuba City: I am the fortunate possessor of a small orchard in Sutter County, but I am not at present carrying it on myself; however, for a year or so I had some experience in the fruit business, and that experience fully demonstrated to me that horticulture may successfully be carried on as woman's work; I see nothing to interfere with her making a success in that branch of the business, provided, of course, she is in love with the business and takes it up as a business. I did not begin at the bottom, but through the unfortunate circumstance of my husband's death, I had, as you might say, to jump right into the business and take it up. I knew but very little about it, and found in taking up the business that I not only had to learn how to handle the fruit, how to pick it, how to market it, how to cultivate the land, and all those things, but the orchard was very badly infested with scale, and I had to study up that portion of the business, and found it a very lively business—the bugs were very lively, and I had to be very lively to get ahead of them, or else I wouldn't have had any orchard. But I feel that I have made a success of horticulture. I gave it up principally because I had no family, and I didn't care to be alone on the orchard, and my health failing, I thought it was best to do so; but I have not lost my interest in it, and probably at some time I may take it up again.

F. A. KIMBALL: As an evidence that the destruction of the forests has a very great effect on drying up a stream, I would like to say that in New Hampshire, where I was raised, when I was a boy I remember

many of the small streams were perennial streams and never ran dry, and on the borders of which I could count some forty farms that had at one time or another been entered for a premium at the State and county fairs in competition with the best farms of the State, and I can count forty of those farms now on which there is not a single house—the forests have been removed, the brooks have run dry. I believe that the preservation of our forests, or, when cut down, the replacing or planting of new trees, is a matter of great importance to the State, and should be insisted upon by such laws as govern in such cases.

XVII.

TRANSACTIONS OF THE FOURTH DAY.

THURSDAY, November 19, 1892.

The convention was called to order at 9 o'clock A. M.
President COOPER in the chair.

PRUNING THE APPLE AND THE PEAR.

By A. CADWELL, of Stony Point.

Through the solicitation of Dr. White, State Horticultural Commissioner for the Sonoma District, I will give you my experience in pruning trees, especially the apple and pear. In my locality we raise as fine apples, pears, and cherries as they do in any other part of the State, by pruning as little as possible; but this little must be done right. In the beginning I did some terrible work, for many years using my own and others' experience, and still did not attain the best results. So I commenced to try a different plan, working close up to nature's work. The first lesson I had was with the Roxbury Russet tree. This tree bore very fine apples for many years, but finally stopped bearing and growing, so I headed it back and got no wood nor fruit. The next year I cut the old stumps again, but with no better results. The next year I cut all the fruit spurs off, and that year I had a beautiful growth of wood. This pleased me, and the next year I had a fine lot of apples on the young wood, and a fine growth. After that I cut off all old spurs, leaving only one or two buds to bear fruit, and allowed the tree to make all the wood it could. This was a success. I then concluded that I was pruning my other varieties to excess, especially the Yellow Newtown Pippin trees. I practiced the same plan in this case—allowed the trees to grow and pruned off the spurs. The old wounds healed over and the trees became very vigorous. It acted like magic on my Spitzenbergs, Bellflowers, and Greenings. I also had Bartlett pears that had been getting smaller for several years, and I could not see the cause. I had pruned to get wood, but I neither got wood nor fruit. I finally went for the spurs, and the next year the growth would surprise any one. So after that I did not cut the tops, and those same trees are thirty feet high now. You may ask, What do you do with the fruit that grows on the tops of those trees? Why, I let it fall and pull it out; they have abundant crops besides—a striking contrast to the little dwarfs they used to be.

Twelve years ago I set out many young trees in the place of old trees, and resolved to let nature take its course and not head back for ten years. Those same trees have been pruned only where branches were too low. In this way I find that at first the tops will go up twenty or thirty feet high, and in due time they will come down with fruit, so that you can pick the fruit from the ground. Then there will be a young growth start

up from those branches bent down, and make a beautiful top right over your head, besides bearing all the time. Then cut those branches off from six to eight feet from the body of the tree, and you have a foundation superior to trees huddled to death when young; then there will be few places to heal over compared with the present system; and when I do cut a limb from the body of the tree, I cut as close as possible and cover with wax, or something that will stay. Young trees will not bear until they have attained age enough to mature their fruit spurs, and nature will do better than any man in that direction.

I also found that in cutting off the low branches you must be cautious and cut where there is a strong branch running up, or otherwise the whole limb withers and decays. It will be there the next year the same as you left it, and finally will have to be taken off close to the body.

It is better to let the top of your trees grow out of your reach, and never pick the fruit thereon, than to head it too much. Do not cut off the ends of new wood on old trees. Instead, cut the oldest wood; cut fruit spurs mostly.

The peach tree should be left alone until it bears the first crop, or even the second crop; then, as the tree gets older you will have to cut all old wood out and enough of the new to make a strong new growth every year, or you will not get the best of peaches. Please bear in mind that our locality is in the fog belt, and that my observations will not apply to every locality.

Now, I will say this: that it is better in my locality to set out young trees and head them to your waist, and afterwards for ten years never put a knife into the tops, only cutting such branches as are in the way of your horses. I can convince any man of this theory that will take the pains to investigate.

DISCUSSION ON PRUNING.

PROFESSOR HUSMANN: It seems to me that that essay contradicts itself so much that nobody else need either contradict any of the statements or pass any criticism upon it.

MR. MCWILLIAMS: I take great exceptions to that article that has been read. In the first place, I have pears that are growing twenty feet high. He says let them fall. They will burst wide open; you cannot do anything with pears that fall thirty feet; you certainly would get but very little fruit that is fit for shipping, or for canning, in that way. Another thing I take exception to: He says trim your trees up so you can plow close to the trees. Now, I have trimmed my trees in every conceivable way I have been told, and finally I have come to the conclusion, with the experience of some thirty years, that I have a mind of my own, and shall trim them to suit myself. Now, the great expense with our peaches is in thinning, and when I have my trees so that I have to climb up on a ladder, I find it is a great deal of trouble to go around and thin them with a ladder. I first thought I would let them run up, but they run and run until they got entirely too high and at the expense of the low branches. This year I have got my trees trimmed with not a limb higher than six inches to a foot, so that it is a perfect hedge, you may say. It is true I can't plow, but at the same time the expense that is saved in dispensing with the ladder and all the work in attending to

the trees overcomes the labor of hoeing off the weeds that grow under the shade of the trees. I have my orchard right low down; it shades the trunk of the tree, and saves expense in that way, and the trees are just as thrifty, and I have had just as fine peaches as ever I had in my life. The limb bends down to the ground, and I have quit trimming them up for the purpose of saving trouble in plowing close to the trees, and I find it is a success.

MR. JOHNSTON: As the author of the essay is not here to explain his paper, I will endeavor to do something for him. You who have been careful in listening to the reading, will note that he starts in by saying that he has had no experience; and undertaking to learn, he made mistakes, and he also says that his theory would not apply to all localities; he is speaking for mountainous, rough country. He acknowledges to have ruined some trees by his experiments, and that before he got any fruit he got his trees thirty feet high. Then he tells you how to commence and raise trees; in that I think he is pretty nearly correct. So far as the Bartlett pear is concerned, he says do very little trimming for several years, but that after the tree gets a certain age until the fruit spurs come out and produce fruit, let the tree grow up, and as it bears fruit it will spread out, if you remember, so he could pick the pears from the ground, and not be thirty to fifty feet high. His thirty-foot and fifty-foot high trees were those that he had been experimenting upon, and he tells us not to do the same as he did when he commenced, but to do as he is doing now: let your trees grow while they are young, and when they begin to bear they will spread out and make large trees. I think the argument is a good one, especially in mountainous countries, where they spread out but don't grow so tall. Just as long as you keep cutting the top off the tree it will grow up, and the more you cut the more it will grow. I am very much in favor of his theory, so far as the Bartlett pear is concerned; I am not so much in favor of it in reference to the peach, for I differ very much with him in that regard; but as to the idea that it contradicts itself, I differ with the Professor, for he tells what he did do, and then what he ought to do, or what he is doing now; that he is raising trees which spread out in wide branches.

MR. BERWICK: I begin cutting my trees, pruning off the wood for several years. I don't have my trees thirty feet high and lopping over, which means a long, thin branch with fruit at the end. I want to have it where I can pick it by hand if possible without mounting a thirty-foot ladder, and I have successfully followed that plan in raising a few trees only.

COLONEL HERSEY: In planting an orchard, I cut the trees down to sixteen or eighteen inches, and all the shoots come out from the sides; if there are two that come out together, and that look as if they would split, I cut them away and let one come out lower down, so that when the tree grows it is not going to split apart. I have been troubled with some of the trees planted on my place before I came there, and I have been obliged to put iron bolts through them in order to prevent them splitting down when they are loaded with fruit. If there are two branches come out like this [showing], cut out one of them, and let some come out below; if you do not, you will lose the other. Now, after the first year's growth you will find several little branches run up, all the way from one foot to four, and whenever it becomes prudent in pruning them, I cut them down to three in number and cut them off

to about a foot long; that is to say, if there are five shoots that run up, if I have courage enough I cut off two of them and leave three, cutting them off to about a foot, and so arrange them around the tree that they will not form this close union or close growing together and split down when they become loaded, and so that each one will act independently on the stock from the other. Next year you will find a still larger growth of three or four or five feet running up from these three spurs, and you will find all the way from three to five shoots on each one of those, and you will find two that look very much as though they were coming out the same, one running out of the top and the other coming out of the bottom. Now, the general disposition is, if a man does not study it, to cut off the upper one, which will leave dead wood with the lower one, and if that grows heavily it will bear down and will split through that dead wood. Though your trees will not look quite so well, do not cut off this upper one; cut off the lower one, and then the other one may swing to the ground—you may take hold of the top of it and pull it down to the ground and it will not split, but if you cut it the other way and at any time during the season pull it down, it will split. I cut on those stalks to two, and if you have three the first year, you will have six the next, and then out of those six there will be from three to four to each one, making eighteen to twenty-four, as the case may be. Now, pursue the same process the third year, leaving them about eighteen or twenty inches long, and by clipping this back each year you get strength of wood in the trunk of your tree. I prune in this way till I get up to four years old. I prune the fourth year and prune none after that, except where limbs are intertwining, or where there are four or five shoots come out of one. I just cut off two or three of those, leaving two, because they will all run out fruit spurs and the next year bear fruit, and if you have more than two, they will bend down and inevitably break some of them. Two will be enough, and that will give you from twenty to thirty shoots to bear fruit, which is enough. In the years following the fourth year I am adopting this plan: that you cut out some of these shoots which run up, and then others that come out will not interfere with the limbs, nor chafe. You want to cut them thin enough so that the fruit spurs which come out of the sides of the large limbs will have room enough to grow, bear, and protect themselves, so that there will be no occasion nor necessity of this limb becoming entirely barren from too much wood or too much leaf growth. If you notice other trees, you will find some that are very thick; that the fruit spurs are all off as high as this [showing] in the center of the tree. This is the result of the tree being too thick, as I understand it, and there being no opportunity for growth. At first I did as everybody else did. I pruned my six-year-old trees, cut them back at the top, and the result was I got no fruit. As good luck would have it, one year we were checked by laziness or by running about and doing other people's business, or by something, I do not know what, but we did not get around to prune our orchards, and there were four acres of the largest trees left until the blossoms had got out so far that it was unsafe and imprudent to prune them, and had to leave them for the next year. The result was I got a little over forty tons from four acres with seventy-five trees to the acre, twenty-four feet apart—and unless you are too selfish, I would advise you not to plant any kind of trees less than twenty-four feet apart, unless you can irrigate. If you get ten tons of

fruit from one acre, it seems to me you are pressing the land about as hard as you ought, for if you get three tons of hay you think you are destroying the land almost, and you ought to be satisfied when you get five or ten tons of fruit, with the growth necessary to sustain it. As I say, I got forty odd tons of fruit from four acres; that was in 1891. This year I got more fruit from that four acres than any other four acres that I had, and I had twenty-seven acres in bearing trees, so that it does not appear that the drain upon those was too great. We are only keeping up the thinning now. Those trees were seven years old before I got any fruit, because, as I believe, I kept cutting them back and for some reason unbalanced the growth of the trees in some way so they would not produce fruit. Now I have adopted the plan of not pruning after the fourth year and I get a good crop of fruit and a good-sized tree in the sixth. That is my plan on prunes. As to peaches, I have raised peaches enough on my trees; they are not yet very high, and being naturally lazy I work for the purpose of punishing my laziness. I don't like to climb, and if there is anything I can do to prevent it, I do it, and I do it by cutting off the up-shooting limbs on my peaches. I have also pruned in the same way the few pear trees that I have. In the apple trees, as I only have a half dozen, and I want them to grow so small that they will not be fit for market so that I can make myself a good drink of cider, I let them run as they will, and got thirty boxes, of forty to fifty-five pounds each, off of one tree one year. They are not very large to be sure, but they would have been larger if we had had more water; however, they made very good cider. Now, my impression is that the peach tree wants to be pruned after the buds have so thoroughly started that you can tell the difference between your fruit bud and the bud that simply will grow wood. Cut off a portion of this year's growth, and then cut the others back so that there will be two or three fruit buds to furnish fruit. I have been able, until this last year, to get somewhere from seven to eight tons to the acre of the very best quality of fruit, of good size, so that even the canners have found no fault and never weighed a pound back.

MR. ADAMS: Is it true that the prune drops as much from the young trees, which have not overborne, as from the older ones?

COLONEL HERSEY: I don't know about that. My crop was very small from young trees; the blossoming was very fair. Whether or not it was the cold that caused the dropping about the time they got the size of a wheat or barley grain, I do not know.

MR. ADAMS: The gentleman suggested that the dropping was caused by the large trees overbearing for a series of years.

COLONEL HERSEY: I had the best crop this year from my oldest trees, and my trees are ten years old.

DR. A. E. MINTIE, of San José: I have been through the orchards this season a good deal, and found that the complaint is just as much of the dropping from the young trees as from the old ones. I noticed particularly that the young trees suffered just as much in that line as the old ones.

PRUNE CULTURE FROM A COMMERCIAL STANDPOINT.

By J. E. GORDON, of San José.

Many years ago a humorist with a world-wide reputation being asked for his advice to those contemplating matrimony, boiled down his answer to the one word "don't," and my advice to the grand army who are about to enter the ranks of the prune growers in search of a fortune, is equally brief and sententious—don't. The humorist's advice has not been heeded, and men and women are constantly entering into the bonds of matrimony, notwithstanding the fact that the newspapers tell us that marriage is a failure and a lottery. The fact that it is a lottery seems to be one of its chief attractions, and the same fact is equally true of the prune business in all its stages, from its inception in California's sunny nurseries until it reaches its grave in the stomachs of our Eastern brethren. My sincere advice, therefore, to nine out of every ten who would forsake their present avocations to enter into this untried field is, briefly, *don't*; but to the tenth, who may possess all the qualifications necessary to insure success, the following facts may be of value:

In the first place, don't enter our ranks under the impression that we are lonely; on the contrary, the fruit industry, of which the prune is an important element, now numbers, assuming 40 acres to be an average orchard, five thousand producers, to say nothing of the thousands of distributors, and it has passed our gold and grain production, and become the leading industry of the State. Eight years ago, when the writer entered the business, California's prune product was hardly a million pounds; last year I handled over a million pounds myself, which was scarce a thirtieth of the whole.

Don't engage in this business unless your heart is in it; unless you are fitted for it, and prepared to stay by it.

Don't listen to the oily tongue that would assure you that you can live in San Diego or Alaska, and run an orchard in the Santa Clara Valley, because it cannot be done successfully. It is worthy of, and needs, your undivided personal attention.

Don't go into the business unless you have ample capital to buy a healthy bearing orchard, or wait for a new one to come into bearing. The trials, losses, and disappointments of the multitudes who have tried to raise an orchard without the means to do it properly, make too sad a picture to portray, and we will pass it with the simple reminder, don't go and do likewise.

The writer came here eight years ago seeking rest from the excitement of a wholesale mercantile business in San Francisco, not knowing a prune tree from an apricot, and bought the highest priced bearing orchard in the county. It was an orchard set out by business men, on business principles, and under proper conditions, and has always paid a good interest on \$1,000 per acre, and he has never regretted the act, and to those who are able to do so this is a practical solution of the prune problem.

Now, as to the capital required, it will depend of course on the scale upon which you wish to operate. In this county, land near the railroad is held at \$200 per acre; five to ten miles back, at \$100. The highest priced is not necessarily the best, often the reverse, and under no circumstances should you pay to exceed \$150 per acre for level valley land,

because the future of the industry will not warrant it. Cost of trees, planting, and cultivation first year, \$30, or say \$180. Five years must elapse before a crop can be obtained, at an annual cost for cultivation of \$10; taxes, \$2; interest, \$20; sundries \$3; or say $\$175 + \$180 = \$355$ per acre, besides cost of living, and provided your trees all grow and have no set-backs.

Having a love for the business and the necessary capital, the most important consideration will be choice of location. Don't be led away by the idea that you can raise as good prunes in one part of the State as you can in another, because you cannot. Every green fruit shipper in the State knows that the best pears come from one district, the best cherries from another, and our own San José canners know that when we would compete for the best peach trade, we must seek the fruit outside of our own county. For the same reason, it is a notorious fact that the best prunes in the world are produced in the Santa Clara Valley, and particularly in that part near Los Gatos, Saratoga, and Cupertino, known as the west side. Every intelligent horticulturist must admit that foothill prunes grown without irrigation are much superior to those grown in the valley, whether irrigated or not, on account of their greater percentage of sugar and fruity flavor. When our driers buy prunes grown in adjoining counties and mix them with our own, their inferiority is so marked that they rarely repeat the experiment. The loss by shrinkage is much greater, and the flavor so insipid, that it does not pay to handle them. This is equally true of the irrigated valleys of Southern California. Ten years hence the prune grower of Los Angeles will wish that he had stuck to his orange groves, and the residents of Tulare will realize that the very conditions which render it the natural home of the raisin, make it equally unprofitable for the prune. There is no personal feeling in this statement, because, although the writer's home is in Santa Clara County, he has large interests in Tulare County, and has unbounded faith in its resources, but not as a prune center. Herein lies a source of great danger to the prune industry, because thousands of orchards are being planted in unsuitable locations, which in a few years will be producing millions of pounds of inferior fruit, which will bring down our good fruit to a price leaving but a very small margin of profit. We must then cease to sell our product as California prunes, but under a name which the markets of the world will then have recognized as a type of the highest excellence, that of "Santa Clara" prunes.

Having decided to locate in Santa Clara County, don't buy a piece of land because it is widely advertised. While judicious advertising is both proper and profitable, yet we all know that the greatest humbugs are always the most widely advertised, and this is particularly true in land deals. Don't be in a hurry; carefully examine the soil and characteristics of each piece submitted; compare the growth and condition of adjoining orchards with others you know to be good. If there are no adjoining orchards let it alone, unless you can afford to experiment in untried fields for your country's good. Over 50,000 prune trees were replanted this spring near Hanford, Tulare County, to replace those dying from too much alkali. What a world of toil and trouble might have been saved had they been planted in this valley.

Don't pay a high price because it is near a railroad, because your crop is not perishable and is not sold green or to a cannery, but will be sold to the nearest drier, or dried by yourself, and a few miles' haul is not

an offset to a high price for your land, particularly if the price of fruit be low. The price named, \$150 per acre, is high enough; \$100 would be better, and good land can be had at that figure. In choosing a location climate is a potent factor, second only to the character of the soil, and only when the two are properly united can we secure a perfect prune. Prunes will grow all over California, so they do all over Europe, but we all know the marked difference that has always existed between Austrian and Turkish on the one hand, and French on the other. As the finest prunes have always been produced in the valley of the Lot in southern France, so we find the same conditions in the contour of our Santa Clara Valley, its distance from the ocean being such as to aid in producing that long, even temperature and slow ripening which are all important in developing the saccharine and imparting the flavor so essential in a first-class prune. The greater rainfall in the extreme north of California, Oregon, and Washington, and the excessive moisture causing the fruit to split and crack, shrivel, and lose its flavor, renders these parts unfit for the cultivation of the prune. The same remark applies to such parts of Southern California where excessive irrigation is practiced, and refers to the French prune of commerce only. Italian and perhaps Silver prunes may be grown under such conditions, but these are not under consideration. Oregon and Washington can never compete with us for another reason: they are obliged to use driers, while we can cure in the open air by the direct heat of the sun, which imparts an aroma or bouquet which no artificial means can equal.

Having bought a suitable piece of land, don't think all you have to do is to scoop out holes 20 feet apart and stick in trees, but plow, plow the whole tract, the deeper the better; it may cost you \$5 or even \$6 per acre, but it will come back to you in fruit an hundred fold. If you can raise a crop of corn or grain before planting, all the better, but don't plant any crop between the trees to deprive them of nourishment, particularly hay or grain; corn is least harmful, and shades the trees.

Don't be so foolish as to buy cheap trees. Of all follies, this is the greatest. Don't buy Eastern, or Oregon, or other outlandish trees, but go to a reliable California nurseryman, or some neighboring orchardist, many of whom raise a few thousand every year for sale. Don't buy two-year-olds, but wait until you can get one-year-olds.

Don't make the mistake of planting your trees 15 feet apart because you can get nearly 200 to the acre, while at 20 feet you can get but little over 100. An acre will not support 200 trees, and they must necessarily die young; 20 feet is near enough, 25 feet is better.

Don't plant your trees until you know that the stock and soil are adapted to each other.

Prune, budded or grafted on peach stock, in a light, warm, sandy soil, will do well—and is the usual conditions—while on damp, clay ground only the Myrobalan, or wild plum stock, has so far been successful. On heavy, dark, alluvial loam, slightly gravelly, almond stock is better—bitter almond if possible—and is the best of all for our foothills, where deep gravelly and sandy soil abounds; irrigation is not necessary, as the almond root reaches down to moisture and thrives where the peach root would die.

Don't be induced to try German, Italian, Silver, or other varieties for which there is no market—especially the Silver prune, which came to us from Oregon, and to whence, by all means, let it return. The prune

of commerce, known as D'Agen, was first planted near San José by Louis Pellier, in 1856. The first orchard of the same to attract attention was the Bradley orchard, near San José, and the next and possibly better known was the O'Banion & Kent orchard, near Saratoga, now owned by the writer, under the name of Miramonte. There is a variety of this prune improperly called Robe de Sargent, which is but a synonym of D'Agen. The real name is D'Ente, and the fruit is known by its dark color when dried, its glossy surface, requiring but little dipping, and its slight acidity, which, like the German, causes it to be preferred by many. The prune-growing district of France is a little larger than our Santa Clara Valley, but has six times the population. Agen is the town from which most of the prunes are exported, and corresponds to San José in this country. There are no commercial orchards, as we have here—one acre is a good size farm, and the prunes are carried to market in baskets on the heads of the women, and sold to dealers, who pack and ship the medium and small sizes, retaining the large ones for home trade. Their net profit varies from \$30 to \$60 per acre, the larger returns being always from the foothill farms, as in our own case.

One reason for the superiority of our prunes is that we always propagate from seedlings, while in France the rule is to propagate from suckers—the very worst system possible. Under these unfavorable circumstances, and their exhausted soils, the life of a prune tree is twenty-five to fifty years, so the croakers who think our oldest orchards (fifteen to twenty years old) are ready to die, will probably die themselves before their predictions are verified.

Don't believe machine drummers, who assure you that the latest patent cultivators will keep your orchard in perfect condition. They are usually nuisances, soon finding their way to the junk shop. Stick to your plow; plow every year, not every other year; then harrow and clod-mash, and you will have done a job to be proud of. Nothing has yet been invented to beat the old reliable plow and harrow.

Don't allow any weeds to grow, and keep your soil so thoroughly pulverized that when the ripe fruit drops it will not bruise. Such thorough cultivation renders irrigation unnecessary, except in a year of light rainfall. One good wetting down during winter will be of benefit, but summer irrigation is of but little value.

Don't get rattled on the subject of pruning, which has proven a most prolific breeder of cranks—no two alike. Prune; prune when the trees are young; prune when they are old; never, of course, to excess, but until you have a stout, stocky trunk, capable of sustaining large crops without bending or splitting, and not liable to die easily; then keep on pruning, and you will never regret it. A magnificent tree, with its branches sprawling all over the ground, and splitting and cracking under its load, is a scene so shiftless and degrading that we will not dwell on it.

Don't get scared about pests. Like the measles, you are sure to have them sooner or later; but prunes are less troubled this way than any other fruit. Considerable capital is invested in drugs and spray pumps, but nothing has yet been found to equal nature's remedy—the parasite known as *Chilocorus bivulnerus*, or twice-stabbed ladybird.

If you must spray, don't buy any patent mixtures from unknown advertisers, but buy pure drugs at wholesale, and do your own mixing.

Don't get excited and think you are ruined when the prunes begin to

drop in the spring. Let them drop; get in and help them drop some more; it is nature saving you the expense of thinning, and what are left will be larger and better for it.

Don't listen to the tree agent's statement that the demand for prunes is practically unlimited, and will tax the entire prune-growing area to its fullest extent to supply. Give me the product of the Santa Clara Valley and I will supply the whole world. It has a tillable area of a quarter million acres, which, at only one ton to the acre, would produce 500,000,000 pounds, nearly ten times the present consumption of the United States. Don't spend too much time ascertaining the condition of the crops in France or Turkey. The American apple crop is the true barometer of our prune market. When there is a good supply of dried apples, our Eastern sisters in their marketing don't care if our prunes are 5 or 10 cents per pound, but when there are no apples they must have prunes, and as we have always compelled them to pay a round price, it is not surprising that they are not more popular; because 10 cents to us means 12½ cents to the wholesaler, 15 cents to the retailer, and 20 to 25 cents to the consumers, and they cannot and will not stand it when they can get a substitute. The French crop of 1890 was the largest for nearly twenty years—40,000,000 pounds—while the average for that period was only 20,000,000 pounds, or about the present California average, and after trying during the last two years to retain their hold on American markets by mixing their product with ours, and imitating our packages and labels, they have practically surrendered and are seeking other markets. During the season of 1888, the writer took an active part in a well-concerted movement to bear the market for the purpose of securing a wider distribution, and succeeded in arousing the enmity of many who snubbed him by saying they wanted no 5-cent fellows coming around. The result was a success. Prunes sold at 4 to 5 cents per pound, were sold East way below any former price, found their way into the mouths of thousands who had never tasted one before, and caused such a demand that the foreign were driven out, and the large yield of 1891 readily marketed, and those 5-cent fellows had more to do with the present condition of the prune market than the much talked-of tariff.

Don't expect a crop in three or four years, and when you do get one don't expect 1,000 pounds to the tree. We read of such things down South; but overwork a three-year-old colt and you will have a horse fit only for the boneyard. Apply the same principle to a prune tree and you will soon have an excellent quality of firewood. It stands to reason that life cannot be maintained under such a strain.

Don't be deceived by the report that Jones of Napa, or Brown of San Bernardino, sold his crop at the rate of \$500 or over per acre. He may have had but one acre, or under unusual circumstances secured that price one year for a few acres, but don't go to figuring out 10 acres at \$500, and expect \$5,000 per year off of every 10-acre lot in bearing, or you will come to grief, and deservedly so. A properly trained and cultivated orchard, after its sixth year, can be expected to produce annually an average of 100 pounds per tree, or 5 tons per acre; average price last five years, \$40 per ton, or \$200 per acre. A liberal deduction for cost of production, including taxes and interest, is \$75, or \$125 per acre profit, being 10 per cent net on \$1,250 per acre, or 30 per cent on actual cost. Don't flatter yourself, however, that this state of affairs is to continue; on the contrary, the average the next five years will not be over \$20 per

ton, or \$100 per acre, while the expenses may be kept at \$60, or say \$40 per acre profit, or 10 per cent net on actual cost. This is better than most mercantile ventures, and should satisfy any reasonable man, but it can be obtained only under the favorable conditions herein set forth. Thousands of acres have been and will be planted that through ignorance and bad management will never produce a paying crop; and it will be in this as in every other department of life, a survival of the fittest. Those who understand the business and attend to it are likely to make money out of their superior goods, even at the very low prices that are likely to rule in the future.

When your crop is ready to harvest you will find but one way to handle it, viz.: to dry it. It can be canned, but is not salable in that form, and there is no demand for the fresh fruit.

Don't be in a hurry to harvest your crop. Men have been known to knock off the fruit with sticks and clubs, and shake the trees to their very roots. Such prunes when dried would pass for shoe leather. Let the fruit remain on the tree until ripe enough to fall of its own weight, or by a very slight jar.

Don't dry your own fruit. Don't listen to your neighbor, who dried ten tons and sold for 10 cents, when he could only get 2 cents green. Take the last five years, or since we have had prunes to sell, and the grower who has persistently sold his crop green to the nearest drier and balanced his books in September is way ahead of the speculator who wants every cent there is in it, and won't give the other fellow a show. We are born speculators, and the same spirit which induces us to take our chances in the great California lottery of prune growing makes us hold our crop to take the chances of the market. I never knew an intelligent farmer who did not admit that prompt sales of any produce when ready for market, netted the best results, and prunes are no exception to the rule. When the farmer or grower passes out of his domain to enter that of the commission merchant, he usually comes to grief. The driers have been the best friends the grower ever had or will have. They were our friends and neighbors, risking their all, at all times paying the highest prices, and with one or two exceptions paying promptly and fully. And what have they met in return? Not even common courtesy, but abuse and misrepresentation, causing many to fail outright and many more to remove their business to Tulare and other newer fields, where let us trust they may be better appreciated. The result will be we will be brought nearer to the consumer—one middleman less, but the one we can least afford to lose. The Eastern buyers and their agents will build stately warehouses along our railroad tracks, at our expense, fix the price they will pay, and divide the crop between them. This they can readily do, because if every man is to dry his own crop, there will be no uniformity, the lowest price paid to all, and the buyer get all the benefit of the careful grower's extra quality. They will then lay down the law after this fashion: 1 cent per pound green pays you a profit; three pounds will make one of dried and cover all expenses, therefore we will pay you 3 cents for your dried prunes. Where will our friends be then, who have been sitting up nights figuring out their fortunes on a basis of 10 cents per pound?

A partial remedy for this condition of affairs lies in coöperation, a combination of ten or twenty growers for the purpose of drying and

marketing their crop. But this relief is only temporary, only while good prices can be had. Let one or two poor years ensue, and the managers will be accused of every crime under the sun, and be glad to retire in favor of others, probably less competent, who will soon wreck the association. It is a saying that when a man makes a failure of everything else he opens a real estate office, and accounts for the prejudice so many entertain against such dealers, and the same remark can be applied with greater truth to fruit growing. The percentage of intelligent growers who attend our conventions, keep posted, and understand the needs of the business, is small, and it is not surprising that such heterogeneous elements cannot be brought into one harmonious whole. A better solution of the difficulty lies in an exchange, such as the Santa Clara County Fruit Exchange. It ought to be an easy matter to convince one hundred men, each having 10 tons of prunes to market, that it is better to allow the exchange to offer 1,000 tons for sale and sustain the market, rather than have one hundred men, with a pocket full of samples, wear the life out of the limited number of buyers and break the market all to pieces in their anxiety to realize. A plan of such an exchange is before the growers of this valley, and the only comment necessary, is that it meets the approval of all the practical business men who have investigated it. The advice not to dry your own fruit is therefore well founded when applied to the majority of growers owning from 10 to 30 acres; but some of us have 100 acres or more, in which case we must be prepared to do our own drying, and even a step further, be our own salesmen.

Under the circumstances, a few directions as to drying may not be amiss. Don't economize as to necessary modern implements. Don't, I beseech you, dip your prunes in an old iron pot, where the mud is so thick you can almost cut it with a knife. I have seen this done, even this very year, in an establishment that claimed to produce first-class prunes, and I don't know who I pitied the most, the proprietor or his customers. Have some regard for the latter, and use plenty of flowing water. The best machine for this purpose is the Cunningham dipper, which has two compartments, the first containing boiling lye, which must be kept boiling by means of steam coils. The prunes drop through a hopper onto a draper, which carries them up and over into the next compartment, filled with cold water, and out of that drops them on trays 3x8, holding about 80 pounds to the tray, which can be handled by two men, and are more economical than 2x3 trays handled by one man. The drying is facilitated by grading into three or four sizes as they come in from the field, but this grading should not prevent grading after they are dried, as buyers are getting very captious and insist on exact grading, the slightest variation being seized upon as a pretext for rejections and reclamations, except in years of scarcity, when everything goes. Chicago has been our largest customer, and at the same time the most unprincipled, going to extremes in this matter which no other city has dreamed of. Slow drying, like slow ripening, is essential to quality. A prune that takes a week to cure is far superior to one that dries in two days—another objection to prune culture in our hot valleys of the interior. A climate free from fog is also desirable, so that the trays need not be stacked every night. They are sufficiently dried as soon as the water is all evaporated, but should be soft and pliable and not rattle, unless you are going to ship them to Chicago, where they want them as

dry as gravel stones, so they can turn the waters of Lake Michigan on them to their greatest advantage.

You now having escaped the Scylla of the business, stand confronted by the Charybdis, a monster that would rob us of all the benefits we have secured up to this point, and give them to the middleman, and that is the kind of package in which to ship. Don't make the fatal error of shipping in bags. It is a device of the devil, concocted in Chicago, compared to which the tariff scare sinks into insignificance. You cannot look to your commission merchant for help in this strait. He will stand by the buyer, because his commission is easier earned by that course than by working hard for a better price for a better article. Any fool can sell a man what he wants by cutting the price, but it takes a smart man to sell him an extra quality, well packed, and such men are very scarce in that business. By selling in bags you lose your identity. The dirty, dusty bags, with juice oozing out of them, are no addition to a well-kept store; are cut open and thrown away, while an attractive box and label is a perpetual advertisement of your name and locality. By selling in bags you open the door to frauds in grades, weight, etc., after they have passed out of your control, which is not possible when properly packed in 25-pound boxes. By selling in bags you lose any advantage in quality your prunes may possess, for in that shape a prune is a prune, and the skins and pits of irrigated districts, raised at one half the cost of yours, are mixed and sold as California prunes, which may thereby in time sink to the level of Turkish prunes. The sole object of buying in bags is to adulterate with inferior California and foreign prunes; and secondly, to soak them with all the water they will hold, that the increased weight may cover cost of boxing in packages that may advertise their business, not ours. Last year the writer was offered a high price for his entire pack in bags by a French firm, who wished to pack same under French labels, but the offer was declined, for that reason only. At least 90 per cent of the product of a first-class orchard should range from fifty to ninety to the pound, and should be carefully packed in 25-pound boxes, under an attractive trademark; the balance may be sold in bags. If your commission merchant cannot sell them in boxes, find one who can, or if necessary be your own commission merchant, which the size of your business will warrant. I do not wish to detract from the value of the commission merchant as such; on the contrary, I believe in employing them, and very cheerfully pay the 5 per cent they charge, which includes guaranty of all sales, and relieves you of the detail of distribution, which you cannot do for 5 per cent; but let the services end here. When you undertake to make them your bankers, you commit a fatal error. As you value your life, your liberty, and your property, don't let any commission merchant own you. Get what advances you need from your banker, and if you cannot, better sell out to some one who can; you will never regret it. In seeking a market for boxed goods, waste no time on Chicago. You can do better in New York, Boston, or Philadelphia. Go East yourself, and by personal contact become familiar with the wants of your customers. One such visit is worth years of correspondence.

Don't be in a hurry to ship your fruit in September—such fruit is not cured fruit, and reflects no credit on grower or seller. It should lie in your packing-house several weeks, to go through the sweating, or equalizing process; and the latter part of October is soon enough to ship, if

quality be an object, and if you wish to avoid the danger of rejections, which are sure to follow such shipments. It is argued that our prunes are too sweet, but this is a good fault, and really makes them a very economical article, because the consumer, in buying his fruit gets his sugar with it. It is a common saying that prunes are the poor man's fruit, owing to the low price at which they are sold, but were it not for the sugar they contain they would be the dearest. Take, for instance, this year's price, 9 cents; one pound soaked and cooked equals three, or, say 3 cents per pound, while one pound of peaches or apricots at 14 cents—or, if cooked, seven pounds—equals 2 cents per pound. Very few, probably, have figured this out this way. We find, then, that foreign prunes are inferior to ours because they are largely propagated from suckers, while we use seedlings; theirs are raised on soil worn out a hundred years ago, while ours is practically virgin soil; theirs are cured during the rainy season in ovens and driers, cooking same, while ours are dried in the open air by the sun's rays, and have to be cooked but once. It is not surprising, therefore, that we have secured the home market, and are likely to retain it, tariff or no tariff. Now that the election is over, a Republican may be able to state that the tariff is of but secondary importance to the prune grower, without being called a traitor. If the 2-cent duty be so vital, how can we consistently explain the columns of reports of \$500 to \$600 profits realized all over the State? If the duty were removed entirely, which I hope will not occur, we can still make money under proper conditions, if we get but \$20 per ton instead of \$40 to \$60, as has been the case for several years.

The California State Board of Trade, through its Chairman, Gen. N. P. Chipman, has sent forth the statement that we can raise fruit cheaper in California than in any other place in the world, and the reasons have just been stated. And although we have no export trade now, the time may come when we can send our coals to Newcastle, even with the duties levied by France and Turkey; and then let reciprocity take the place of tariff, and California will hold her own in the markets of the world, and get rich at it.

The greatest danger lies in the continued reckless planting of more trees, when enough—in fact, too many—are already planted. There are about 20,000,000 growing deciduous fruit trees in California, of which at least 5,000,000 are prunes, which, at the very moderate estimate of 100 pounds per tree, will produce 200,000,000 pounds of dried prunes. Now, what are we to do with them. They are not a luxury, but by no means a necessity; even the growers themselves rarely have them on their tables. Their mildly laxative and slightly acid qualities aid in keeping our system in order, but only a limited quantity are purchased by any one family, say one 25-pound box to each. The population of the United States during the last decade has averaged 60,000,000. The usual average of five persons to each family would give us 12,000,000 families, each consuming 25 pounds, or say 300,000,000 pounds. But we cannot count on this, because millions of families do not care for and never buy them. What we do absolutely know from the National Bureau of Statistics is that for twenty years prior to the advent of California prunes the total consumption was about 30,000,000 pounds per annum, which, through the popularity of the California prunes, we have increased during the last eight years to 70,000,000 pounds, or a little over one pound per capita. Our population is

increasing at the rate of one and one half million yearly, which ten years hence would give us, say, 80,000,000 population, and at the same rate require 15,000,000 pounds more, or say 85,000,000 pounds of prunes. But assuming that we so push matters as to quintuple this normal increase, and we would then require 145,000,000 pounds, while we now have enough planted to give us 200,000,000 in less than five years. Surely, it is time to call a halt in this wild boom, and turn our thoughts to other fruits now neglected, but equally profitable. Our only consolation in case of such a glut is that prunes make excellent hog feed, and one acre of prunes will produce more pork than one acre of grain. From the same bureau of statistics we learn that the average price of imported prunes for twenty-five years has been 5 cents, which, if maintained, would mean to us 4 cents, when the rail freight is reduced to 1 cent, which it will be soon. As already stated, 4 cents will give us all a very fair bank account, so we have not so much to fear in the way of price if we can stop further planting. Of course, thousands of trees that have been improperly planted will die or be abandoned, but they will not offset the additional planting that will certainly continue year after year in spite of statistics. It is said that children and fools always tell the truth; if so, the gray hairs produced by the vicissitudes of business would indicate to what division the writer belongs. A truer maxim, however, is that "Truth is mighty and must prevail," and "Truth crushed to earth will rise again," and though he be crushed beneath the avalanche of land sellers and tree sellers, he will lay aside his pen with the consciousness of a duty done, and that future conventions, in recalling the records of this one, will say: "Well done, good and faithful servant."

MR. MOTHERAL: I do not object to the gentleman's statement about Santa Clara prunes, but I do object to a part of that statement that they have more sugar in their prunes than we do in Tulare and Fresno Counties. The facts are that we have the richest raisins in the world, for the reason that we have more sugar, and I would like to ask anybody as to whether it is a fact that we get more sugar in our raisins and less in our prunes. The conditions are the same. We certainly could get just as much per pound, per tree, per acre, as they can in Santa Clara; and I would like any gentleman to answer the question, as the saccharometer tells the truth, if we are behind anybody. While I am not here to boom Tulare, for we have boom enough, I would like to be put on record for saying that Tulare County is the prune county of the State.

Recess.

XVIII.

AFTERNOON SESSION.

REPORT OF COMMITTEE ON RESOLUTIONS.

JUDGE AIKEN, on behalf of the Committee on Resolutions, to whom was referred the following resolution, offered by Edward Berwick: "Resolved, that this convention demands the immediate construction of the Nicaragua Canal by the United States Government for the free use of the American people, and deplore the intervention of any company, as cal-

culated to thrust one more monopoly, the greatest of the age, on a long-suffering people," presents the following report, which, on motion, was adopted :

SAN JOSÉ, November 18, 1892.

To the Fruit Growers' Convention:

The Committee on Resolutions respectfully report upon the Nicaragua Canal resolution, submitted for consideration, the following memorial to the Congress of the United States:

To the honorable the Senate and House of Representatives, in Congress assembled:

Your memorialists, the fruit growers of the State of California, in annual convention assembled, at the City of San José, on this 18th day of November, 1892, respectfully represent that they are engaged in the production, preparation, and marketing of fruit to supply the demand in this and foreign countries.

That better and cheaper transportation facilities than now exist are of the first importance to the continued growth and prosperity of the fruit industry.

That your memorialists heartily commend to your consideration the making and early completion of the Nicaragua Canal, to be controlled by the Government, in the interest of the people of the United States and the commerce of the world.

That upon the adoption of this memorial copies be furnished the California congressional delegation.

W. H. AIKEN,

Chairman Committee on Resolutions.

The Committee on Resolutions also presents to the convention their report on the preamble and resolution proposed by E. E. Smith, which, on motion, was adopted :

SAN JOSÉ, November 18, 1892.

To the Fruit Growers' Convention:

The Committee on Resolutions having under consideration the resolutions favoring the establishment of a Division of Roads of the Department of Agriculture at Washington, D. C., have the honor to report the following memorial to the Congress of the United States:

To the honorable the Senate and House of Representatives, in Congress assembled:

Your memorialists, horticulturists of the State of California, assembled in annual convention at the City of San José, this 18th day of November, 1892, respectfully represent, that the establishment of a "Division of Roads" in the Department of Agriculture at Washington, D. C., would meet with their unqualified approval, and be of great benefit to the people in well-directed efforts of road making, so much needed in this country.

That this memorial, upon adoption, be sent to the congressional delegation from California.

W. H. AIKEN,

Chairman Committee on Resolutions.

JUDGE AIKEN, Chairman of the Committee on Resolutions, reported back the following resolution offered by Mr. Berwick: "Resolved, that this convention believes that it is for the interest of the fruit growers of California that the United States Government should purchase and operate all existing transcontinental railroads," with the following report:

SAN JOSÉ, November 18, 1892.

To the Fruit Growers' Convention:

The Committee on Resolutions, having given the subject of government ownership and control of railroads due consideration, have the honor to report:

The ownership of railroads is not the established policy of the Government of the United States, and the adoption of such a radical measure is too remote and uncertain in its beneficial results to warrant its serious consideration at this time.

W. H. AIKEN,

Chairman Committee on Resolutions.

Also, reported back the following resolutions: "Resolved, that this convention believes that the best interests of the fruit growers and of all classes of citizens in California would be subserved by the disbursement of government funds in railroads and means of transportation, rather

than in the building of additional ironclads for offensive and defensive purposes. Resolved further, that these resolutions of this convention be sent to every United States Senator and Member of Congress, requesting them to do their utmost to forward such legislation as shall fulfill the wishes of the people herein expressed, and the Secretary of the State Board of Horticulture is hereby directed to carry this resolution into effect," with the following report:

That better and cheaper service on the part of existing corporations, and increased facilities of transportation by land and sea are of present and paramount importance, and efforts in these directions should receive the hearty support and encouragement of the horticulturists of the State.

W. H. AIKEN,
Chairman Committee on Resolutions.

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS.

To the members of the Convention:

Your committee to whom was referred the address of the President, consider the subjects therein treated of such vital importance to the fruit growers of California, that they will be treated in detail, as follows:

Annual Meetings.—In regard to the objects of the annual meetings of the fruit growers of the State, we are fully prepared to say that every meeting substantiates the language of the address, and we can find no words better adapted to express our convictions than by quoting almost verbatim from the address, as follows: "The harmony, unity of feeling and purpose always present, and which have in all instances governed our deliberations, are creating a public sentiment, and on our maintaining the same unselfish interest in the general welfare will eventually become a controlling factor in our State affairs."

Fruits.—The pleasure experienced and appreciated in viewing the new and improved methods employed by the fruit growers of the State is in some degree destroyed by the fraudulent packing and false labels pursued and made use of by a few of our producers or packers, and we believe the subject of such widespread importance that it demands consideration by this convention, and unless discontinued will call for the creation of a Department of Fruit Inspection, which will effectually suppress this unmitigated evil.

Parasitic Insects.—In regard to the search for and importation of insects which will destroy the parasites which infest many of our orchards, we cannot too strongly urge its importance, and believing as we do, that nature has created parasitic insects which will hold in check, if not ultimately destroy, many if not all of our insect pests, for this reason we fully concur in the recommendation that a special committee be appointed to present the matter to the State Legislature, and urge in the strongest manner possible an appropriation of \$5,000 per year for four years for this purpose, and that the services of Mr. Albert Koebele be secured, and that he be sent to such places as may offer any possible opportunity for procuring such beneficial insects as may protect the grower of any product from insect pests.

Forestry.—Effective laws should be enacted by our National Legislature for the protection of our forests, or their reproduction, when the necessities of consumption require their destruction. This important matter should be in charge of a special committee.

Olive Oil Adulteration.—Further congressional action than that recommended for the protection of our forests is recommended for the protection of the olive oil industry (which to-day is in its infancy) against the atrocious adulterations which are being practiced, and a product placed upon the market which at once not only degrades the olive oil industry as a business, but is productive of disastrous consequences to the human family, as was fully shown by scientific essays read before the Convention of Olive Growers which assembled in San Francisco on the 21st of July, 1892, and deliberated on this subject. To the transactions of this convention the fruit growers are respectfully referred. And to the end that adulteration of olive oil and all other food products may be suppressed, we most heartily adopt the recommendation of the President's address, and recommend such amendments to the "Pharmacy Act" as will absolutely prohibit the sale of all adulterated food products.

Railroads.—Your committee have not had the time necessary to fully present its views on the question of government ownership of railroads, a subject which requires the collection of a mass of statistics from countries which have adopted the system, and without which we are not prepared to recommend the change from individual or corporate ownership to ownership by the General Government. We are, however, prepared to recommend that in all future charters for railroads, such safeguard should be thrown around them that the interests of the people shall have such protection as will secure the lowest rates of freight and fare, and the most efficient service compatible with due protection to the owners of such roads.

We congratulate this convention.

WM. JOHNSTON,
Chairman.

The report was, on motion, adopted.

RESOLUTIONS THANKING THE PEOPLE OF SANTA CLARA COUNTY.

JUDGE AIKEN offered the following resolutions, which were adopted :

Resolved, That the fruit growers of California, in accepting the invitation to hold its convention in your city, would not do itself honor if a public recognition was not had of the hospitalities so cordially extended and so elegantly carried into effect.

Resolved, That the reception tendered the fruit growers by the citizens of San José was an unbounded success, and that its memories will long remain.

Resolved, That the successful efforts of the citizens to show to the many strangers the evidences of the vast capacity of this section entitles them to the thanks of the convention.

Resolved, That special thanks be tendered to the press of San José for its elaborate reports of the transactions of the convention, and particularly for the publishing (by the "Mercury") of entire papers and essays read before the convention.

IRRIGATION FOR THE DEVELOPMENT OF FRUIT.

By HENRY A. BRAINARD, of San José.

In responding to the invitation to furnish something on this point which may be the basis of a possible discussion, I have taken the view that a general essay on irrigation was not intended, for such a field would be a broad one not easy to bring within the limits of what is permitted here; and I shall not, indeed, find space to more than present an idea or two on this special branch of the subject.

I shall suppose, to begin with, therefore, that we have an orchard of trees already grown to bearing either with or without irrigation, and the problem before us is to make it bear the most perfect fruit. It will really make a difference whether the trees have been grown up to this point with or without irrigation, whether we shall continue the same or not, for it goes almost without saying that if they have been irrigated up to this time that process must of necessity be continued; but this will not greatly alter a general principle, which we may state.

The fruit tree is a most wonderful laboratory; a most wonderful manufactory. It takes the crude materials from the air and soil, combines and manipulates them in a way so refined and mysterious that our brethren of the retort and condenser, of the test-tube, the blowpipe, and the microscope, are baffled in their attempts to understand fully just how it all happens. The results are well known, for they have been the foundation of an industry which has brought us all together here—results that feed millions and provide a support for millions more. The great medium by which all these crude materials are taken into solution and transported from the soil to the laboratory and from the laboratory to all the tissues of the growing fruit, is water. This very laboratory and manufactory is self-created (recognizing ever the great Creator who planned it all), and the very same conditions are required to create it as to continue the process and create the fruit. All these delicate operations require the further aid of warmth and sunlight. To adjust all these in most nearly perfect harmony is to produce the most nearly perfect fruit. When nature furnishes these in just the right proportions all is well. When water is lacking in the form of frequent raindrops from the skies or steady percolation through the soil, it must be supplied artificially; and this is irrigation.

The question of the need or desirability of this comes home to every fruit

grower in California, for in almost every section there are many months of cloudless skies; months of strong summer heat; months when we are surrounded by an atmosphere that is greedy for moisture and takes it freely.

The question of the necessity for irrigation depends very much on soil and circumstances. It has long been the pride and boast of Santa Clara Valley that within its charmed circle irrigation was not needed for the most perfect development of fruits. Abundant rains fall in the mountains on both sides in winter, and descending the slopes, this water sinks below the surface and flows underground in porous gravel beds, at various distances beneath the floor of the valley. It seems to exist there in vast reservoirs, and in a part of this section, where these reservoirs are pierced by the well-borer's auger, the precious store rises to the surface and from two to twenty feet above. In the valley itself there is usually a rainfall sufficient to thoroughly moisten the surface soil each year down to a depth where permanent moisture exists. Thorough cultivation keeps the soil in such a condition that it draws continually from the deep hidden sources, and the roots of the trees are in a soil perpetually moist. When this is the case, there is very little need for irrigation for the development of fruit. The millions of little absorbent rootlets in contact with this perpetually moist soil take up all they need; the tree grows vigorously, and the fruit steadily increases in size and weight from the ovary in the blossom to perfect maturity. Stores of starchy matter are elaborated and when the right time comes, the rich, warm sun turns them into sugar. We have then a perfectly developed fruit—all we can ask for or desire. Possibly the supply of an extra amount of water during summer might have induced a more succulent growth of tree—possibly it might have forced into the tissues of the fruit more water, causing it to become gross and misshapen; cause the peach to have a bursted pit, and the bitter flavor which should have remained in the seed kernel alone, become diffused throughout the flesh. This over-development we regard as quite as much imperfect as an under-development.

Suppose, now, that for some reason this condition of a perpetually moist soil about the roots fails, and there are many reasons why it may fail, then we see our beautifully organized workshop hampered in its work, and in many ways. There is not water enough to perfectly dissolve the materials in the soil to be carried to the leaves. The leaves lose their freshness, and with this loss they lose their power to absorb material from the air, which is even greater in amount than that which comes from the soil. There is a lack of the medium which serves to convey the elaborated sap from the leaves downward to every tissue of the tree and fruit. The result is an undeveloped fruit. Supply this lacking moisture in any way and we tend to correct the trouble.

There are many reasons why moisture may thus fail. In some sections the regular rainfall is never sufficient to moisten more than a few inches of the surface. Again, the structure of the soil may be of such a kind that the rain falling in the distant mountains is not conducted beneath and stored for time of need, as we have seen is done in Santa Clara Valley. The planting of thousands and tens of thousands of trees may make such drafts upon the natural moisture that it is, in a greater or less degree, exhausted. There may be some special conformation of the strata which prevents the steady circulation of the water which lies

only a little way below. Any of these conditions may create a need for irrigation to develop fruit.

We were not long ago called to examine an orchard situated on apparently the richest soil. In their early life the trees grew well and perfectly developed their fruit. Of late there had been a failure to a certain degree, as the dry season came on. Investigation showed that this fine, rich soil was only four to six feet deep, and that below it lay a stratum of gravel. While the trees were young there was moisture enough in the surface soil to cause a fine growth of tree and to ripen the fruit. But as the larger trees made more demands for moisture it was soon exhausted, and the stratum of gravel not only prevented the retention of water, which would have occurred had this layer been more impervious, but it also prevented the rise of moisture through it from below. In such a case the owner must irrigate to keep this top stratum of four to six feet of rich soil constantly moist, possibly turning on the water every two weeks after the rains of winter are exhausted.

In places exactly similar large, deep holes were dug to plant the trees, reaching clear down through the underlying gravel, and establishing a connection of soil of such a character as would readily conduct moisture from below, and in such orchards there has been no difficulty; but with the old orchard, planted without these precautions, we must irrigate.

On some of the rich mellow sediment soils which are fertile, porous, and deep, such as are planted with some of the famous cherry orchards of Santa Clara County, the best plan to develop fruit has been found to be to give a thorough irrigation in winter, if there is any lack of rainfall, or if it does not come in the proper time. Another irrigation is given in April or May, generally in the latter month, so that the young fruit may receive no check in its growth. It is then found to develop its full size and the maximum amount of sugar. In the case of cherries, just as soon as the crop is gathered the water is again turned on to stimulate the tree and make it recover from the exhaustion of ripening its fruit and the shock of the rather rough handling it received in harvesting. The tree then perfects its buds and makes a good summer growth, which prepares it for a good crop the following season.

In almost all the soils of Santa Clara Valley the only irrigation is applied in winter, using the surplus waters of the streams. Furrows are plowed between the rows of trees both ways, leaving each tree standing in the center of an inclosed space. Water is turned into the furrows and openings made into these inclosures, which are filled, then closed again, and the water allowed to soak away, filling again if necessary or sufficient water is to be had. This six or eight or twelve inches of extra water is applied by flooding, which insures a complete moistening of the soil down to the permanent or ascending moisture. As soon as dry enough the surface is plowed and harrowed smooth, to prevent evaporation, and the moisture thus supplied carries on the growth during the whole season and develops the fruit in the highest degree. Peaches, prunes, apples, and pears treated in this way seem to reach the highest degree of development in size, sugar, color, and flavor, with excellent shipping qualities. The size can be somewhat increased by an irrigation just before the time of ripening, but at the expense of sugar, flavor, and good shipping quality, and this we do not call a perfect and symmetrical development of fruit. We have known prunes thus irrigated just before ripening to require four pounds of green fruit to make

one of dried, while others, grown without a particle of irrigation, were of equal size, and required only two and one half pounds, or even less, to make a pound of the dried product. At our request the record of two orchards was kept last year—one that of Mr. Volmer, near Los Gatos, and the other that of Mr. Flanders, in the south part of the section known as "The Willows," near San José. The result was a due proportion of large-sized prunes, and ratios of 2.13 and 2.16 between green and dried fruit. In neither of these cases was there any irrigation, and it does not seem that irrigation would have been a benefit. The present year even smaller ratios have been obtained, but rather at the expense of large sizes.

Last winter the rainfall was about normal as to amount, but instead of one or two heavy downpours, it came in gentle showers of from one fourth to one half an inch, with pleasant days between, and the consequence was that the proper connection was not made between the upper and lower moisture, and there has been a check to the perfect development of the fruit in many cases. Growers who were able to supply irrigation as soon as this deficient development was threatened secured fruit of better size and weight.

We may state it as a rule, then, in the Santa Clara Valley, that with a normal rainfall, coming so as to thoroughly soak the ground in late winter and spring, thorough cultivation will keep the land moist and in just the condition to produce the highest development of fruit, and by this we do not mean size alone, but the most harmonious and perfect combination of size, form, flavor, color, and sugar. In fruit for drying sugar is one of the largest elements of value. The highest development of fruit is not produced by heavy irrigation, but by keeping the soil in a moist condition. By winter irrigation any defects of rainfall in time or amount can be remedied, and thus a full development secured.

When irrigation in summer is desired it is here easily accomplished by means of wells and pumping engines, and in many cases the prunings of the orchard will furnish sufficient fuel for the purpose. After the experience of last season many wells have been sunk all over the valley, so that in time of need water can be had at a moment's notice. All understand that water is a necessity, and if it does not appear naturally it must be applied artificially.

Apricot trees which show a checked growth after harvest, will be greatly benefited by an irrigation as soon as the fruit is gathered, and stronger and better buds will be developed for the next season's crop.

It was the writer's good fortune to be present in the great fruit-shipping district of Placer County during the shipping season of 1892. We found there a soil of disintegrated granite, rich in mineral matter, but very porous and not well calculated to retain moisture. It would be our idea that without irrigation such a soil would not have moisture enough at ripening time. No matter how much rainfall might come, no matter how much winter irrigation was had, the porous character of the soil and the excellent drainage would permit it to retain only a given amount of water, and this not enough to bring on and ripen a good crop of fruit. The growers there have water in ditches always at their command. They can and do turn on the water every few days and keep their soil always moist, and from its nature it is impossible to get it overwet, so that with even this almost constant summer irrigation the ground is never surcharged with water, nor does the fruit become over-developed

in size or watery consistency. In that section it is water, ever and always during the growing season, that develops the size, color, and flavor of their fruit. We found no irrigation here by flooding. Little streams ran down along the rows of trees, and the open soil took up just what was needed. A question of fertilization may arise in consequence of this, but that, of course, it is not our province here to discuss.

We see, then, that water is indispensable everywhere. When soils can be kept moist by cultivation, it is all that nature can ask to permit her to do her best work. When cultivation cannot do the work, irrigation must step in and supply the want, and whenever the orchardist provides himself with facilities for furnishing water when needed, he places himself beyond the influence of the vicissitudes of dry seasons.

To try to do by irrigation what ought to be done by cultivation is a mistake that is being made by many where water is abundant. Sodden, water-soaked soil will produce sodden, water-soaked fruit, something not desired nor desirable to driers, canners, shippers, or consumers.

To keep the soil simply moist at all times, so that the soluble material required by the tree is constantly going into solution; water enough to keep the roots fresh and growing, and to provide a medium to circulate freely in all the tissues of the tree for the conveyance of organized material to every part, is the ideal condition. Keep it so, if possible, by cultivation. If not, then by irrigation just when it is needed to keep up this condition, be it in spring, summer, or winter.

In the arid regions irrigation is of course a necessity, but even then care must be had not to over-irrigate. Our ideas have been directed in these remarks to deciduous trees. The great citrus industry of California has been made possible by irrigation, and the subject as applied to this fruit should be separately considered.

Irrigation of the grape, is practiced in many places. With the raisin and the table grape it is a success. Wine grapes should never be planted where irrigation is required. We think we see a disregard of this in the thousands of acres planted by the Natoma Vineyard Company in wine grapes, which are flooded with water. We were told by the manager that no attempt was made to make a fine wine. This vine crop goes into sweet wine and brandy. Only in the dry hills and mountain sides can the rich flavors of our clarets and sauternes be developed in a degree to compete with the vineyards of France.

Shall we irrigate to develop fruit? Yes, with prudence, with judgment, with liberal cultivation, and whenever circumstances demand it.

Recess.

XIX.

EVENING SESSION.

President COOPER in the chair.

FRUIT GROWING IN THE SANTA MARIA VALLEY.

By O. W. MAULSBY, of Santa Maria.

John Charles Fremont stands charged with having retarded fruit culture in the Santa Maria Valley almost fifty years, when, on his memorable march down the coast, he camped for a time at the head of our valley with an Englishman named Foxen, who had married a Spanish wife and had at that time a fine peach orchard in full bearing.

Being well acquainted with the topographical features of that section, Fremont compelled Mr. Foxen to pilot him over the Santa Ynez Mountains, thus avoiding the death-trap set for him in the Gaviota Pass. As a fitting punishment for the crime, the Mexicans cut down all of Mr. Foxen's peach trees, and for a quarter of a century thereafter our valley was nothing more than a vast plain, rainless throughout many months each year; brown, parched and dreary, practically devoid of perennial vegetation; in some places barren stretches of sand were raised in clouds by the wind, and the unfortunate traveler passing that way was glad to reach the sheltering hills, and his after reflections about the place contained no thought of horticulture.

The first settlers of our valley were stockmen and grain growers, and, as a matter of comfort, planted groves of eucalyptus trees about their premises. These trees grew remarkably well, and so encouraged the settlers that an age of gum-tree planting ensued. Nearly every farmer in the valley planted a row or two along the outside lines of his claim, and on many places groves of from five to ten acres were planted. A few years transformed this uninviting plain into a valley most beautiful to behold. All the avenues are on section lines crossing at right angles, and marked on either side by long lines of tall trees affording shade and shelter, and lending enchanting beauty to the scene. The annual rainfall has materially increased, and the quick, retentive soil produces a remarkable growth of vegetation.

Fruit culture for profit began in our valley about eight years ago, since which time tree planting has continued on an increasing scale, until now every owner of land in the eastern half of our valley either has, or is preparing to have, an orchard of from ten to one thousand acres. A number of experimental orchards were planted several years prior to this time, and these, to a great extent, have served as a guide to subsequent plantings. By these early orchards it was learned that apples did remarkably well, and a number of orchards are now in profitable bearing. Pears also do exceedingly well, and have been largely planted; they mature very late, and always find a good market.

While many varieties of plums have proved failures with us, there are a few varieties which do exceedingly well. The French prune seems well adapted to our local conditions, and is one of our leading fruits; it is a thrifty grower, producing heavy annual crops. This prune has been planted in our valley to the extent of fifty thousand trees.

The apricot, however, takes the lead in numbers and in profitableness.

It outgrows, outbears, and outnumbered any other tree in our valley. It comes into profitable bearing first of all. The fruit is large, abundant, and cures to perfection in our climate without the aid of artificial heat. It outnumbers our prunes to date just ten thousand trees, and the returns from these this year are of far more local importance than the historic "Return of the Ten Thousand."

Third in numerical importance is the improved soft-shell English walnut. Bearing trees of this variety in various parts of the valley prove its adaptability and profitableness, and cause walnut enthusiasts to claim for it a future position at the head of the list, and it has it now with regard to acreage; we already have over one thousand acres devoted to this tree, and it will be extensively planted this winter.

The peach, although it grows and produces well, has never gained that prominence with us which it really deserves, not through any failure of the tree to grow and produce an abundance of fine fruit, but wholly on account of local conditions regarding curing and marketing the fruit. Inadequate transportation facilities precluded any attempt at shipping fresh peaches, and there was practically no local market. The sun cannot be relied upon for curing peaches in our valley, on account of the foggy spells liable to occur at any time during peach season. With the advent of the cannery the past year came driers and evaporators, which greatly increased the demand for this fruit, and the acreage devoted to peaches will probably be doubled the coming planting season.

It is not just anywhere that the almond grows to perfection, but there is a section of country along the south side of our valley where the growing, producing, maturing, and shucking reach so nearly perfection that it would be difficult indeed for the most exacting almond advocate to find cause for complaint. I brought with me several samples of almonds from this section, which are now on exhibition. The top soil where these almonds grew is a fine sand mixed with a not very liberal amount of vegetable matter. The subsoil, which is from two to eight feet from the surface, is a silica formation, rich in phosphates, approaching the consistency of so-called "hardpan" when exposed to sun and atmosphere, but when moist it is as penetrable as granulated sugar. There is considerable almond enthusiasm among the people in this special section, and quite an acreage has been planted.

Cherry culture was originally considered a failure with us, but with the introduction of new varieties it has received a fresh impetus with already a successful showing. The writer has Royal Ann and Centennial cherry trees six and seven years old that have produced their second crop of large, well-formed, and luscious fruit.

As to citrus fruits, we lay no claim to them, nor have we ever made any attempt at growing them in a commercial way, although there is scarcely a dooryard in the valley without its orange and lemon trees with as fine specimens of fruit as ever grew, and in all stages of maturity, but aside from the adjacent cañons and hillsides, we have not the necessary heat for properly maturing these fruits.

Statistics concerning orcharding in California have received so much attention that great accuracy characterizes almost every statement, with probably but one exception. The item of incidental expenses connected with the care and cultivation of an orchard before it comes into bearing has seldom if ever been overestimated. For proof of this, inquire of

any one who has planted an orchard and brought it into bearing. In this particular, however, we are probably more favored in our valley than in almost any other section. Aside from our soil being a sandy loam and exceptionally easy to handle, annual crops of beans are raised between the rows the first three or four years, which help to pay running expenses, and some of the leading orchards of our valley did not cost the owners anything from the time they were planted until they came into bearing. Instances are on record where orchards were cared for under contract at good round figures, and the beans raised in the orchard paid all bills for the year and left a small deposit to the credit of the orchard.

Had it not been for this cheap producing feature there would have been but little to encourage fruit culture with us in the past. We had practically no home market. We had \$8 per ton freight to land our dried fruit in San Francisco, where, if we fail to accompany each shipment in person, the returns are invariably third or fourth grade on what is otherwise strictly first class. Samples of our processed fruits have been sent East, and pronounced equal to the best that has ever reached those fastidious markets, and yet in San Francisco they don't go unless we go with them.

Ever-changing conditions have kept us hopeful, and the future looks bright. The successful operation of our new cannery and a number of evaporators the past season have created a home market, which is quite stimulating. The assurance of the completion of the coast route of the Southern Pacific gives us a direct route to Eastern markets. Another very important adjunct of horticulture is just now being agitated by our fruit growers, and is seconded by nearly every rancher in the valley, and that is irrigation. While it is demonstrated that profitable crops can be and are produced without the aid of water artificially applied, yet the fact remains that better, surer, and much more abundant crops can be produced with it, and since nature has provided us with a soil and climate admirably adapted to irrigation and an available water supply, practically inexhaustible and of easy access, we propose to make use of these advantages. This will also solve for us another important question which is claiming the attention of our people, and especially those interested in fruit culture, and that is better roads. Our sandy soil packs hard and smooth during the rainy season, making our highways the pride of the valley and the delight of all who travel them, and with an unlimited supply of water at command we can readily see how we can have the best of roads all the year round.

We have prepared a small exhibit of fruits for the World's Fair, consisting of fresh fruits, preserved in glass, and sun-dried, kiln-dried, and steam-evaporated fruits, prepared the same as that put up for the San Francisco market, the returns from which were for third grade fruit, and the accompanying excuse was that the fruit had been over-graded, under-dried, and too well packed.

COMMITTEE GRANTED FURTHER TIME.

On motion of LEONARD COATES, the committee heretofore appointed to present a report on the paper of W. H. Mills, read before the State Board of Trade, was given further time in which to prepare the report, with instructions to present it to the chairman of this convention.

COMMITTEE ON LEGISLATION.

The President appointed the following Committee on Legislation: Gen. N. P. Chipman, Frank Buck, W. H. Aiken, Fred. Cox, and B. F. Walton.

COMMITTEE ON FORESTRY.

The following were appointed a Committee on Forestry by the President: S. J. Stabler, Abbot Kinney, and Frank A. Kimball.

REPORT OF COMMITTEE ON LEGISLATION.

JUDGE AIKEN, as Chairman of the Committee on Legislation, presented the following, which was, on motion, adopted:

SAN JOSE, November 18, 1892.

To the Fruit Growers' Convention:

The Committee on Legislation has the honor to report upon the memorial to establish a Bureau of Statistics, as follows:

In view of the importance of the questions raised by the memorial and its novelty, it is deemed best that the subject have more thought and discussion than has been possible at this meeting, and the committee therefore recommends that the memorial be referred to the President of the State Board of Horticulture, with the request that he assign it as a topic for discussion at the next convention of fruit growers at Los Angeles.

W. H. AIKEN,
Chairman of Committee on Legislation.

FERTILIZERS AND THEIR USE.

H. A. BRAINARD: A few years ago I began to agitate the question of fertilization here to some extent, and to tell the growers, both personally and through the publication of which I have the honor to be editor, that their lands here were becoming exhausted, that the great amount of wheat which had formerly been raised upon them had exhausted certain elements, and that in raising fruit, particularly those kinds which they sent away to market—pits and all—they were depriving their land of a great deal of phosphate, which seems to be necessary to the production of any crop. I come from the State of New York, where no one would pretend to grow a crop of wheat, or in fact hardly any grain or garden stuff, unless he would fertilize the land with superphosphates. I see nothing of the kind here. The fragrant smell of the material, with which I was so familiar, I miss entirely in California, and I had been here several years before I found that such a thing was ever used here at all. I induced, finally, some man to try it. One gentleman, Mr. Vestal, said he would try it, and he did so upon his cherry trees, which were not coming up to the mark, although he had plenty of water for irrigation. I told him I would put on about 500 pounds of phosphates to the acre and see what they would do. He did it, and was so well pleased that the next year, without saying anything further to me, he put on from 1,000 to 1,500 pounds to the acre and worked it into the soil, spreading it all over the ground. He told me the following year that it had such an effect on the trees that he didn't think they needed any irrigation at all the next year, so he never unscrewed the top of his artesian well at all. He noticed a great improvement in the foliage of the tree and its

general appearance, and if I remember correctly, the product of the cherries was increased from about \$150 an acre to over \$400. I believe in one or two instances out at "The Willows," that phosphates have been employed on orchards. I believe I can tell, upon riding along or going into an orchard, simply by looking at the leaves of the trees, when this fertilizer has been applied. I am sure that in those orchards in "The Willows," where the owners have applied it that the yield has been very large and enough more money made from those orchards to pay for the use of the fertilizer two or three times over. Those who have used it can tell of its beneficial effects.

MR. ADAMS: In the Santa Cruz Mountains, where I am trying to raise fruit, we have a very mountainous country and a very uneven soil, and a good many places near the richest soil there may be some adobe—some alluvial mold, and the next acre will be all shale rock. Sometimes we are able to go around these poor pieces and not bother with them, and at other times we are obliged, for decency's sake, to take them in with the rest, and the question is whether where those spots come with thin soil over shale rock, say the soil is six or eight inches deep, whether it can be made commercially profitable by the use of phosphates or nitrates to raise trees of any size. We raise trees, but it takes them a long time to bear something, and when they are right in the midst of our rich benches, it does not look well—they look spotted, and I would like to know whether it can be made commercially profitable.

MR. SCHULTE: I have had a little experience with fertilizers, particularly with the nitrate of soda. A few years ago I found that my cherry trees were beginning to fade. Some of the limbs were dying off, and they were not growing as well as they should, and consequently a good many of the leaves began to get yellow and the fruit small. I came to the conclusion that there was something wrong and something ought to be done, so I began to experiment with fertilizers. I took a few rows and manured them thoroughly; then I took a few rows and applied superphosphates, and I took some more and applied nitrate of soda. I found out that nitrate of soda did the best work. The trees began to grow more vigorously than ever before; the fruit was larger and the trees looked to be decidedly improved in every sense of the word. I think I was best paid for my investments in the nitrate of soda. The land was good creek bottom—Coyote Creek bottom.

PROFESSOR HUSMANN: In using fertilizers, the original cost is a very important question. I was unfortunately put in a position, when I first came to this State, of taking the management of a very large place in very much spotted ground. We used stable manure, of course, all we could on the ranch, and then looked around for all other fertilizers, and experimented some, and the best and the cheapest fertilizer we found there was the ammoniacal liquid from the gas works, which we could get at Napa for simply the cost of filling some old casks that we hauled there. The manager of the gas works was always ready to have them filled gratis, only we had to pay for the labor of filling them. The way we used it was to mix it in a can with seven gallons of water to a gallon of ammoniacal liquid, and applied it in the hot summer in liquid form. We used to put the cask on the wagon, attach a hose to it, and then apply the liquid to the vines. We found that it would have a wonderful effect, and as one gallon of the fluid will make eight gallons of the liquid manure, it goes very far along. Another fertilizer, which we also

got from the gas works in large quantities, is gas lime, but that must be used very cautiously and scattered very finely over the ground and not too close to the vines or the trees, or else your foliage will become scorched and it will injure the tree. We used that also to a great extent, and we found it of very great benefit in loosening adobe soil, of which we had a good deal there.

MR. BRAINARD: One little point that I meant to have spoken about, which I didn't—it is a point that I am requesting the fruit growers to make some experiments on in the Santa Clara Valley. In some places the Moorpark apricot has the very bad habit of casting off its fruit in the spring. The fruit buds will start out pretty well, and oftentimes before they blossom will all drop off. From certain observations that I have made in one orchard I believe it is owing to a lack of proper nourishment. There is some element that is lacking, and I have seen experiments enough to partially convince me that it is a lack of phosphate in the soil that produces this imperfect formation of the bud; that they don't seem to have a strong constitution, and I would like to have the fruit growers throughout the State, not only here but everywhere, experiment in a small way. Place two or three or a half dozen trees, or half an acre, and use some phosphates, five or ten pounds to the tree, for a couple of years or so, and see whether or not it does not have the effect of strengthening the constitution of the buds on the apricot tree, which are so prone to drop off. The matter is now only in embryo, you might say; it is not certain that it is true, and yet I have such faith in it that I nearly believe it on account of a few experiments which have pointed in that direction.

QUESTION: What kind of phosphates did you use?

MR. BRAINARD: I could not state any particular kind. I do not remember the brand, or anything of the sort, which is used. Its value depends very largely upon the amount of phosphoric acid and nitrogen in it; we need both elements here. The experiments of Professor Hildgard show those are needed. In California most soils have plenty of potash, but look out that your commercial fertilizer has plenty of phosphate of lime and plenty of nitrogen in it. By "plenty" means anywhere from 10 to 12 or 13 or 14 per cent; that is about the average of the general commercial phosphates; I cannot name any brand.

J. P. DUDLEY, of San José: I have had a good deal of experience with cutting up vine prunings and plowing them into the ground, and I believe that is as good a fertilizer as could be wished for. I have a horse-power thrashing cylinder with knives through it, and the prunings are shoved in and then distributed over the ground. I believe I produce larger and better grapes and more of them, and the foliage remains green very much longer than they do without the application. Mr. Levy, in his "Organic Chemistry," says that in the old country they find it is very essential to manure their vines. A gentleman depending upon small acreage, where his vines are quite old, not knowing where he could get a fertilizer, saw that the grass grew better under the vines where the cuttings had been plowed under, and the next year a very great improvement in his vineyard was noticed. It seems that in that locality the fertilizer was so very essential that his neighbors noticed particularly that the gentleman's vines were very much improved, and they could not imagine where he got his fertilizer. He simply cut his vines with his shears and plowed them under. Now, I believe the prunings from

other trees might improve the ground, as it is something that all trees require, and when these prunings are burned up and the ashes left where they are burned, they get but little benefit. I believe the grand remedy in those cuttings is the phosphate, and I see a very great improvement even in applying the potash without the phosphates. I have used phosphates by grinding up bones. I now have tons of unground bones on my place, but I will grind them up at some future time. I have tried also making superphosphates by getting ashes, and I would almost as soon have the ground bone as to make a superphosphate, so far as I could discern.

MR. BLOCK: My advice to the fruit grower would be to fertilize with all vegetable and animal matter that you possibly can—any stable manure that you have; try and keep it damp; if possible, keep the sun off of it. Don't throw out the manure and allow it to dry so that it will evaporate until there is nothing left of any value in it. In the summer rather keep it wet, and if need be put some road dust or any other substance of that kind on and keep it wet; that is what I generally do. Do not make it so wet that it will run away, but keep it wet. I prepare, during the summer, probably three or four thousand loads of manure in that way, and if I have any weeds I pick them and put them in with the other and cover it with road dust or loam or anything else, saving everything that I can, and wetting it, and when fall comes around I have got it ready and haul it out and use it. I will say in this connection that my land is amply rich in nitrogen and I do not need to buy any. If you need any of that you can probably use what they call Chile saltpetre (nitrate of soda), that you can buy at a reasonable rate. Do not use too much of it, because it leaches away into the ground—each rain will leach it away.

QUESTION: How much is too much?

MR. BLOCK: That is hard to say; it depends how your land is. If you have very light soil it leaches away very easily. I should think about from two to five pounds to the tree. Of potash, I think we have enough. Of course, we have different soils in different sections. I have been for several years buying superphosphates and applying them. I have used from 800 to 1,000 pounds per acre, and it has paid me well to do it. If you happen to have a dry season following after the application of it, you may not see the benefit of it that year, but I venture to say if you follow it from year to year, go right along and continue putting it on, it will pay you for your labor. I irrigate, and consequently I put it on in the spring; those that can irrigate I should advise to put it on now, or as near this time as you possibly can before the rains come. The rains will take it down; it will not be washed out, but will stay there.

QUESTION: Do you put phosphates on the same ground each year?

MR. BLOCK: I have done it; yes, sir. The phosphate is the main ingredient to make the seed of our fruit. If the seed is blighted you will have no fruit; it is the greatest tax upon your soil. In some instances probably potash would be necessary. I am simply telling you what I find most advantageous for myself. I utilize all the manure that I can get, and that gives me some nitrogen and some phosphate. You must bear in mind that I have an orchard that has been producing for thirty-five years, and the previous owner has told me, with a good deal of pride, that he double-cropped his orchard and never put any-

thing on. Well, I have reversed it; I stopped the double-cropping of the orchard and kept feeding it, and I have had no occasion to regret it.

JUDGE AIKEN: I would like to ask how many trees to the acre you are enabled to support?

MR. BLOCK: I don't know. I sometimes have been asked how many trees I have. If it is any one out of the State, I tell him I don't know, but perhaps some people that have seen it might believe me. I have all the way from 160 to 680 to the acre.

MR. MILES: You speak about using nitrate of soda. When do you apply that to the ground?

MR. BLOCK: That is hard to tell. I would rather put it on about the time it quits raining; that is the time I would advise. You have to take some little chances and get it as near as you can.

QUESTION: If the ground is irrigated, what time would you use it?

MR. BLOCK: I would put it on probably in April, or as near blooming time as possible. Of course, if you depend on rain altogether, you will have to put it there ahead of the rain, so it will be taken down. If you find we are going to have rain lasting for any length of time, I advise you to delay it; but I can't see how you can tell that.

MR. SCHULTE: In applying the nitrate of soda, I applied mine before the last rains in the spring—some time in March for the first application, and for the second application I simply put a certain amount of nitrate of soda into the water which I applied to the tree in irrigating, so as to get it directly and immediately to the roots of the tree, and I was astonished at the result or effect of this nitrate of soda upon the tree. In places where the trees have actually failed to grow and seemed ready to die, they threw out new and vigorous shoots, and I am satisfied that nothing ever paid me better than the application of nitrate of soda. That has been the case with my orchard; it might be different in others. I wish to state another instance of the application of oak chips. A man had a big pile of oak chips, and his orchard had showed signs of failing. He went to work and hauled those oak chips and spread them around his trees and plowed them under, hoping to see the results a few years thereafter. Of course, he applied quite a quantity. The immediate results, however, were a surprise to him. I think that a great many fruit growers are making a serious mistake in burning their pits, and not taking proper care of them. I think that the nearer we can come to supplying the tree with what it takes out of the soil, the better results we can obtain. I know one man who threw a great quantity of pits around his trees, and I noticed good results in that case. I think the pits are very expensive fuel, when we consider their usefulness as fertilizers.

JUDGE AIKEN: Following the example of our Eastern farmers in enriching the soil by planting clover and grasses and turning them under, I have for more than fifteen years plowed under in the spring two crops of clover and grasses something like a foot high and very thick upon the ground, and I have found this an excellent fertilizer. On land cultivated and enriched in this way, I have raised this year probably the largest amount of prunes per tree in this portion of the State, as far as I know, ranging from 400 to 800 pounds per tree. I find this a very cheap method of fertilizing where the clover and the grasses naturally grow. I know that my neighbors don't wholly agree with me; at least they have not got the clover and the grass to turn under, but they have a system of plowing in winter or very early before anything can make a

growth that can be called green grass or clover, and therefore they have nothing of that kind to warm up and, as it were, pulverize the soil. I find that my soil, after years of cultivation in that way, becomes a very soft, dark, sandy mold, and enables me to plow it almost any time in the year. I believe I could plow that land as late as June for the first time. I know it is said by some that the growth of the clover and grass takes substance from the soil, but I believe that by turning it under and allowing it to rot and decay, whatever it takes it returns there. After plowing I use what I call an Acme harrow, which does not draw out the grasses turned under, and I believe if our orchards could be handled in that way it would be found to be a very cheap and excellent fertilizer.

MR. BLOCK: I agree with the remarks made by my friend Aiken, and I would here make a suggestion that may be of benefit to a great many who cannot plant clover, for it will take a long time to get it started. I have used marsh-mallow to a great extent, and it has done a great deal of good, provided you can get it just at the right time to turn under. If you get warm weather and rain you can't always cut it down right, but if you can get it pretty thick over your land—I am not afraid of having weeds; I like to see them grow, providing I can get them about a foot high and get them under—it strikes me that this is one of the best things. Clover is hard to start, and you can't always get a good crop and get it in in good time, so that you can turn it under at the right time; but at this season of the year, if a person keeps the ground mellow, and plows—I can plow at this season of the year, and generally try to plow dry—now, if you were to seed with mustard—it is a quick grower, and would not cost much—I wouldn't be surprised but what mustard would make a splendid fertilizer for green manuring, when turned under. In connection with what the gentleman remarked about the nitrate of soda, I will say that I have had a grass plot or piece of land that has been used for a long time, and had a very poor crop of grass, and last spring I sowed some nitrate of soda over it and was surprised at the result. Where it had been turning yellow it got a splendid color, and I will venture to say that the crop of hay was increased 300 per cent, and if I hadn't put it there I don't think I would have had a quarter of a crop.

MR. ADAMS: We used to use dogweed in the East a good deal for that purpose.

MR. BLOCK: I am not familiar with dogweed, and couldn't tell. The reason that I suggested mustard is that it is a rank grower and grows at a low temperature.

JUDGE AIKEN: The clover that I speak of is the natural growth of the country—the alfalfaree, as it is called. This is in the Santa Cruz Mountains, about fifteen miles from here.

MR. GRAY: I heard Judge Aiken tell that story once before, and two years ago I tried it, and I don't want to try it again in the same way I did; it was the year we had so much rain. About the time the grass was grown and the wild oats were about eight inches high, I commenced to plow, and before I had plowed very much, it commenced to rain, and kept on raining, and finally when it stopped raining and the ground had dried off a little, I started to plow again, but couldn't make it go, and finally I had to stop and buy a new mowing machine. I had rather a small pair of horses, and the only way I could get through my fertilizer was by going on the jump to get on top of it. I fought weeds all summer, and I don't know as I ever got the best of them.

THINNING FRUIT.

G. M. GRAY: The question is asked as to the time to thin fruit. I shall commence thinning fruit next week when I get home, and shall begin with the shears; that is the time to begin.

MR. MCWILLIAMS: I have already finished pruning my apricots; now I am pruning the peach, and I find that, in my experience, if you raise a crop of barley or wheat, if it is second class, you get something for it; but if you raise a crop of second-class fruit, it is perfectly worthless—you can't get anything for it. Some time ago I tried the experiment of weighing ten peaches that measured one and three quarters inches, and the result was that when I peeled and pitted them there was six ounces of offal. I also peeled and pitted four that weighed a pound, and the offal of the four was four ounces. When I come to sell the peach, those that measured an inch and three quarters will take double the time to manipulate that it did those which weighed four to the pound, and my experience is that it will bring you in debt about 10 per cent, while the peach that measures two inches and a quarter and weighs four to the pound will bring you about 20 per cent profit. Last year I thinned before the frost, and the frost came and thinned a second time, and then my peach trees broke down. Now if I have a tree that I wish to produce a hundred pounds, I leave four hundred peaches on that tree, but if I want small peaches, I gauge the tree accordingly. My advice in thinning fruit is thin on the outside. A peach tree acts like a spindle; if you thin it out here, one peach close to the base of the limb will weigh more than the one out here, but this one on the outside will break the tree down. Trim your peach trees so that they will bear close to the tree; then they will not break down and you can thin your fruit to suit yourself. I find the great objection to thinning peaches is that we want to leave too much on our trees, and my advice to the men who thin fruit is to thin a tree to suit them exactly, and be sure in pruning never to let one limb lie over another so as to shut the sun off, but cut it off so that the sun can get through it. If you pursue this course, and raise peaches that are valuable, you will make a success. My experience has been that my small peaches are a drug on my hands and I can't get anything for them. We had better raise fewer peaches and have them salable.

F. M. RIGHTER: In this part of the country our idea is to thin apricots, or any other kind of fruit, as soon as we can determine whether that fruit is thick enough. When it first presents itself, and you are in doubt about it and don't know whether it will remain there or not, leave it alone, but as soon as you can ascertain whether it is going to remain, then commence to thin. We have been prompted to do this because of the moth, which in some places affects the peach the same as the codlin moth affects the apple and pear. I at one time thinned by fruit all I thought necessary; that is, left about twice as many peaches as I thought ought to remain on the limb, intending ultimately to cut that limb off and only leave one in place of two; but the moth came along at that time and didn't leave two, nor any. That makes it a little doubtful. It is not always safe to say, "I will thin out just so," because there are modifying influences that come in. The vitality of the tree mainly goes to the formation of the pit, so that it is essential that it be thinned early, before much vitality has been drained from the tree to form the pit, and the earlier the better. There is a great variety of ideas about how close

peaches may grow together and do well. One gentleman wants to grow them close to the main limb. Now, I leave one wherever it looks very vigorous, for if you leave a peach on a limb that looks about ready to die, the peach will look that way from the beginning of its existence to the end; but where the limb looks very vigorous and very thrifty, I think the peach will be pretty much of the same nature.

MR. JOHNSTON: How are you going to determine whether the peach is going to stay there or not?

MR. RIGHTER: By the looks of it. This year a good many of us thinned early, and the frost came along and took most all the rest of them. The frost is a good thinner; where the limb has been exposed and the leaves are well away from it the frost is a better thinner than most anybody you can put to work at it. It seems the leaf in itself has a heat, which is thrown off and saves the fruit where there is plenty of foliage. This argues, to my mind, that it is a good idea to have plenty of foliage around. Some people hold that pruning shears are about the best thing you could use when you go to thin, and I have known some persons who scarcely used anything else this year. Whether that is sufficient, I am not prepared to say.

MR. SCHULTE: My men thinned the Salway peaches early this year, and afterwards the curl leaf struck the trees, and the result was there were not any peaches. If we had waited a little longer we might have saved quite a little labor, or the curl leaf might not have taken all.

R. C. KELLS, of Yuba City: In our section—the Sacramento Valley—we consider the time for thinning the peach is from the time it first forms and gets size enough so that we can determine the forming of the peach, up till the time the pit hardens. I had in my orchard a year or two ago some peach trees which I had sprayed early in the season with lime, sulphur, and salt, but the wash did not have its effect upon the tree in time to check the curl leaf. However, enough peaches remained upon the tree to mature and make a fair crop. The trees pushed out a few leaves, but did not make any fruit growth for the coming year. The following year I had a good crop of wood, but no fruit, and that was the result of the curl leaf. We do not practice thinning apricots enough so that I am able to give any advice on that subject. I do not think that pruning is a sufficient thinning with us; our trees grow too rank—they make too much growth; the more we cut them back the more wood they make and the less fruit they produce; we prune too much. We think that thinning necessarily follows with careful pruning. In our particular neighborhood I am considered a crank on thinning, and at first I adopted the rule that I would do the thinning largely by pruning, but I could not make it work. In 1890 I thought I was doing a good job of thinning, and the consequence was that I had to have teams and men hauling poles to prop up my trees for several days, and then the trees broke down. I had picked as much as my conscience would allow me, and thought I was doing good work. I had thinned, for instance, to from four to six inches, and when we came to pick the peaches we found a great many two and three together; it shows that we are liable to overlook some. This year I thought I would do still better thinning, and in driving through I could scarcely see any peaches, and began to think I had better have the men let up a little on that; however, I gritted my teeth and let the men go ahead, and I had the best crop of peaches this year I have ever grown. The

man that was with me said, "You are taking all of your peaches off." I said that that was true, but I had said the year before that I was going to have them thin enough this year; so I will say this, if any one gets excited and scared that their peaches are all going to be taken off in thinning the little fellows, they will probably have enough left.

MR. JOHNSTON: The time for thinning fruit seems to me to be a question of great importance. We on the Sacramento River raise a great many peaches, and our trees always have too many peaches on them until we thin them out, and sometimes we make a mistake and thin our peaches a little too early, and that time cannot be determined until the pit begins to harden. You cannot tell by the looks of the peach until that time whether it is going to mature or not. It is well to go to work and pull off three fourths of the peaches when they are small, and then when the pit begins to harden you can go over your trees a second time, and, as brother Kells says, pull off pretty near all you can see, and then you will have enough left, and have your fruit properly distributed over the tree; but if you thin out before that time, you are liable to have the peaches in bunches over the tree and not properly distributed; because I have raised peaches a good while, and I have watched the growth pretty closely, and I have not been able to determine what peaches are not going to drop until the time I speak of. Of course, there are plenty of peaches deteriorating that you can tell just as soon as the bloom is dropped that they will never mature, but there are plenty more that seem healthy and strong, and nothing to prevent them from making peaches, until about the time the pit begins to harden, when they stop growing. The peach that is going to mature grows right along, and grows very rapidly, and then you can make up your mind that the small peach is going to drop off and not mature; so that my practice is to thin my peaches twice. It is a little hard work sometimes to do it, and difficult enough to get up courage to go over an orchard twice, but I find that is a sure way of making a peach crop on the Sacramento River.

MRS. JONES: When I started in the fruit business, raising peaches, I inquired of my neighbors, and they told me to wait until about the time the pit hardens, and to leave the peaches about six inches apart, and see that they were evenly distributed over the tree. I followed that advice as nearly as possible, and I thought I had made a pretty good job, but for some unknown cause or other the peaches concluded to thin themselves after that, and they did so pretty thoroughly, but what were left on the trees were of excellent size and quality, and I think I made a reputation for my orchard that year, although I was pretty well discouraged at first to see the ground covered again with peaches that I had intended should stay on the limb.

FUNGUS ON ALMOND TREES.

MR. GRAY: I saw in one of the papers last spring an account of a fungus working on the young almond. I have not been able to find out anything about it, and if Mr. Brainard is here and can tell us about it we would like to know.

MR. BRAINARD: I will state that several months ago, several journals described a fungus appearing upon the leaf of the almond. I had never

seen it, except in one instance, anywhere about here, but in an almond orchard in Butte County—I cannot just now remember the name of the owner—I found a well-defined case of it, and I brought the leaf home with me and compared it with the engraving showing the fungous disease. It makes the leaf of the almond look spotted. I placed it under a microscope of moderate power, and it was evident it was a case of fungus. We found only one tree with it. As to a remedy, one can treat all of these fungous diseases with some preparation of copper, either the Bordeaux mixture or a solution of copper and ammonia. We have plenty of formulas in most all of the papers or treatises on fungoid diseases. I keep them standing in the columns of my journal all the time, and I should treat that fungus, if I saw it in any of the orchards, in that way.

MR. COOPER: I will state, in reply to Mr. Gray, who made inquiry as to fungoid diseases on the almond, that upon examination of the opening address of the convention last year, he will see mention made of that; and any one wishing to have further information, by addressing the Government agent, Prof. Newton B. Pierce, stationed at Santa Ana, Orange County, can get the information regarding the fungus troubling the almond tree.

NEW USE FOR DRIED GRAPES.

By J. V. DUDLEY, of San José.

MR. PRESIDENT, LADIES AND GENTLEMEN: I commenced using the grape as a laxative a few years since, and found it all I could wish for. I used the Rose of Peru grown upon clay ground; it ripened late and was quite tart. The weather had become quite uncertain for drying, but through the kindness of Mr. Moulton they were put through his evaporator. I was at the time afflicted with muscular rheumatism, which, to my great pleasure, soon left me. I ate a handful of raisins at night, and found in the morning that my mouth was as moist and pleasant as at night, also a laryngeal trouble soon disappeared that had been with me for many years. The next year we had more put through the evaporator and distributed among our friends, and all reported pleasantly. I then turned to Leibig's Organic Chemistry, where he says the use of wine and fat, which are only so far altered in the organism that they combine with oxygen, has a marked influence on the formation of uric acid. The urine after fat food has been taken is turbid, and deposits minute crystals of uric acid. The same thing is observed after the use of wine, in which alkali necessary to retain the uric acid in solution is wanting, but never from the use of Rhenish wines, which contain so much tartar under the head of calculus. Uric acid calculus is formed in consequence of a deficiency of inspired oxygen or excess of carbon in the food. The medical reports state that upon the Rhine, where so much cream of tartar is consumed in wine, the only cases of calculus diseases are those which are imported from other districts.

I have made a very free use of the tart raisin for the last few years, and am glad to know that all who have used them for liver and kidney troubles are quite as well pleased with their effect as I am. One of our large fruit dealers asked me if I thought the tart raisin would help his rheumatism in his shoulders and his liver trouble. I replied, "Mr. Moulton has been using them for a couple of months; will you make

inquiries of him?" He made inquiries. Mr. Moulton replied, "I cannot tell what they will do for you, but I can tell you what they have done for me. They have cured me of catarrh, dyspepsia, and rheumatism. When I commenced using them I could not get my right hand back of my hip; now my shoulder is as limber as ever."

I have looked up scrofula in its various branches and am quite certain it may be removed from the system as readily as the rheumatic trouble, and prevent cancer and phthisis from putting in an appearance. Also, I believe that after the use of tartrate of potash we need have little fear of an inflammatory action in the system. Pneumonia will not be as prevalent as at present, nor need we have much fear of the bacilli of the Asiatic cholera finding lodgment in our system.

FIG CULTURE AND FIG PACKING.

By D. SHERMAN, of Newcastle.

We know of no variety now being packed worthy of culture save the White Adriatic, though we look for grand results whenever we are enabled to mature the fruit from the imported tree from Aiden, Smyrna.

We favor rooting the cuttings in the nursery, though with care we obtained as fine trees from cuttings set in orchard as from yearlings set at same time—the third year there was no noticeable difference. The tree should be cut back when first set, also the second and third years, in order to strengthen the main branches near the trunk, especially at the union with the stock.

We advocate forming all varieties of trees very low, six inches from the ground being none too low for the peach, while the fig we prefer twelve to eighteen inches. Ladders are a necessary nuisance, still we can manage to prune and harvest without them several years longer than we thought formerly, without sacrifice to quality or quantity of fruit and a gain in the vigor and ability of the tree.

It is to be remembered that we are writing from the interior, where shade is desirable.

Without applying the shears, the fig forms a symmetrical, beautiful tree, whose horizontal branches are apt to split at the stock with its heavy fruit and the additional weight of a careless picker.

We cannot obtain in our locality the desired growth of the tree and size of fruit without water. As to how often and the amount, we are as yet on experimental ground, although favoring application of water early in the season, to be continued not later than August 1st. After the last irrigation the ground should be thoroughly though not deeply cultivated. The gravest question for consideration, and one which may be more or less controlled by time and method of irrigating, is the fermentation of the fruit on the tree. We have this season been free from souring; the two preceding years we were considerably troubled, though not seriously. The trees being young, too late irrigating and climatic changes were the attributed causes. We believe a tree suffering for water late in the season, as well as one over-moist, is liable to ferment its fruit. Whether high, well-drained land, or rather low and not very well drained, the same rule appears to apply. This season we had a block on high land which fer-

mented some of its fruit for need of more late water, while the block adjoining, in lower, better watered land, had but few sour.

Late in the season there are immense quantities which cannot be dried successfully, owing to rains and moist, cool atmosphere. Should we be able to obtain a suitable drier, the time of harvesting and increase of crop would be great and worth striving for.

Previous to this season, we followed the advice of growers generally in hand-picking the fruit. Our ideal fig is one picked from the tree as soon as it is ready to drop by a jar or when it has ceased to derive any nourishment from the tree, the fig being in a shriveled state. In practice it is yet to be proved the best method. We have been gratified with this season's result, viz.: about one half gathered from tree, the other half picked from the ground. If all the fruit would drop of its own accord within a seasonable time, we would not pick a fig from the tree; but as many hang until they become worthless, it appears to be necessary to hand-pick them.

The fruit from the ground is rich in sugar and flavor, though inclined to toughness; this, however, is overcome by manipulation.

The fallen fruit may be put into baskets of any depth; not so that from the tree, as more care must be used, lest it be injured.

After spreading on trays, which can be done rapidly, we subject to a sulphur bath for a few minutes only. Too much sulphur destroys the richness and sweetness. From the sulphur-house the trays are to be taken to the hottest corner of the ranch, inclining them toward the south. Later in the season a concentration of the sun's rays applied to the fruit may be practical. After remaining in the sun from two to four hours, we turn them by placing an empty tray over the figs, having a man at each end, who quickly invert them. The pressing of the two trays together prevents the fruit from rolling. A second turning may be desirable, though we have not considered it essential.

When sufficiently dry, place in sweat-boxes, which should be carefully watched, lest some of the fruit may have been taken up too soon, ever bearing in mind that the less drying the better, provided they are in condition to keep.

After the sweating stage, they can be at once processed, or dipped in boiling water, to kill all insect germs, and stored for months if desirable. Covered boxes or bins may be used.

However, the sooner they can be placed on the market the better, so that they may start the trade before the new Asiatic crop arrives and supplies the holiday trade.

The processing and packing appear to be another industry apart from the growing, but quite within the province of the producer.

Take the figs from bins or boxes; dip into boiling, very thin syrup (made of water, a little white sugar, and glycerine), or in salt, boiling water. We are using the former solution. Our aim is not to match the Smyrna product, but to place on the market our fig in such package and under such treatment as the public prefer; hence, we await the verdict of the people. We sometimes before the syruing run the figs through rubber rollers, which helps in reducing the toughness, apparently thinning the skin. This makes it easier and quicker for the packers. While the figs are yet warm from the syrup, the thumbing and packing may begin. There should be three grades. The first is carefully packed in molds and pressed, remaining under pressure until the shape is fixed,

when they may be taken from the forms, wrapped in paraffine paper, and placed in cartoons, or as bricks of figs in boxes of ten or twenty pounds. A round tin box makes a neat and attractive package, so also does the cartoon. The second grade should be packed in larger boxes, say ten to twenty pounds each.

THE NEXT CONVENTION.

Invitations were presented requesting the State Board of Horticulture to hold the next State Fruit Growers' Convention at Santa Rosa, Pomona, and Los Angeles.

On motion, Los Angeles was recommended.

There being no further business, the convention adjourned *sine die*.

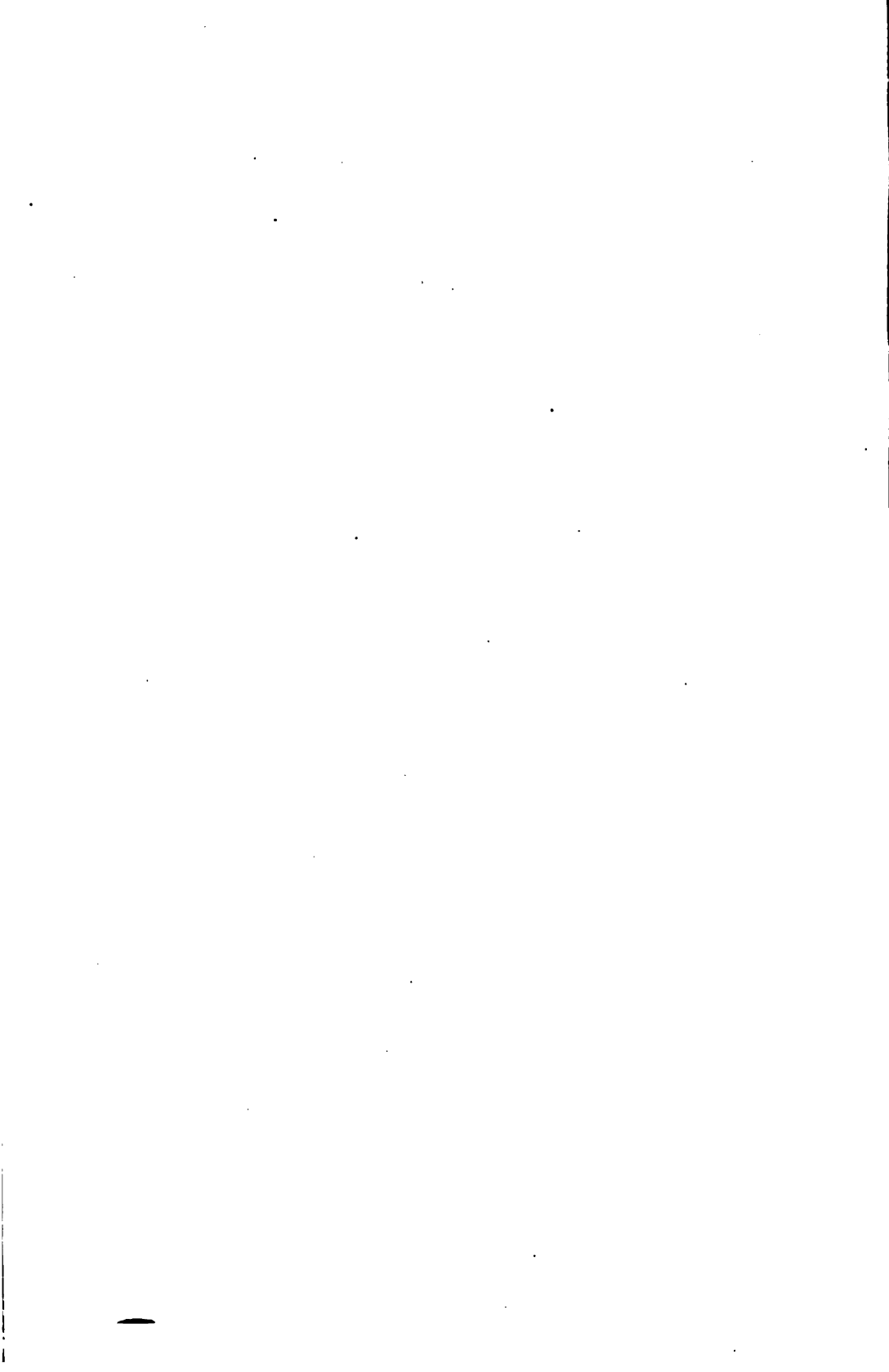
TRANSACTIONS

OF THE

SEVENTEENTH STATE FRUIT GROWERS' CONVENTION,

HELD AT

LOS ANGELES, NOVEMBER 21-24, 1893.



XX.

TRANSACTIONS

OF THE

SEVENTEENTH STATE FRUIT GROWERS' CONVENTION,

HELD UNDER THE AUSPICES OF THE
STATE BOARD OF HORTICULTURE, AT LOS ANGELES,
NOVEMBER 21 TO 24, 1893.

CALLED TO ORDER.

The convention was called to order by Hon. ELLWOOD COOPER, President of the State Board of Horticulture, promptly at 10 o'clock A. M., Tuesday, November 21, 1893.

PRAYER.

Rev. A. T. PERKINS opened the convention with prayer.

VICE-PRESIDENTS—ASSISTANT SECRETARIES.

Hon. Abbot Kinney and Mr. G. J. Griffiths were chosen Vice-Presidents.

Rev. A. T. Perkins, of Alameda, and Mrs. Mattie S. Jones, of Yuba City, were chosen Assistant Secretaries.

ADDRESS OF WELCOME.

By Hon. ABBOT KINNEY, of Lamanda Park.

LADIES AND GENTLEMEN, MEMBERS OF THE CONVENTION: Los Angeles greets you and welcomes you all heartily and respectfully as representatives of the great and growing interest of horticulture. We are glad to have you here for many reasons, not the least of which is the benefit we hope to derive from this meeting of progressive and public-spirited men. California has gloried in the reputation won by the horticulturist. It is he who has advertised our soil and climate, and sent the noble army of fruits as missionaries to tell the world of California. Great as this interest in horticulture has become, we expect to see it still greater. Already we have invaded European countries, and I think that nothing else should satisfy us than such a superiority of quality as will command the highest markets of the world. California contains within short distances wide ranges of adaptability to various fruits, by soil, altitude,

temperature, and humidity. From the sea coast to the mountains we find conditions favorable to every fruit of the temperate zone and of the semi-tropic regions, and some of the tropical fruits. We have hardly yet settled the limits and best product of our different fruits. It is by establishing the best productive conditions for our fruit that we can most readily attain that fineness and excellence of quality that will command the confidence and tribute of the world.

The relations of fruit growers with their laborers is a matter of importance to them, and concerns the community about as much. There has been a tendency amongst us to adopt the maxim, "that as the wage of the laborer is low, so is the cost of production low;" and another maxim, "that the finest grade of prepared fruits demands the lowest price to the individual and the laborer for their economic production." If these maxims be true, the interest of the employer and the laborer are irreconcilable. Under such principles, it will be to the interest of the employer to push down the individual wage to the barest means of subsistence, and still eternally to grind the laborer down. A little consideration would make the whole republic stand aghast at the prospects of our future, under the application of such principles. The principle, "that as the individual wage is low, the cost of the product is low," holds no hope for humanity. The industrial history of the world does not establish this principle, but tends rather to the contrary. While wages have been advancing, the cost of production has been diminishing. Let us then adopt a policy of coöperation; let us say "that the wage cost of product will correspond with the intelligent application of honest effort." Under such a principle, the interests of the employer and of the laborer may be united for the betterment of both. With this principle, the interest of the employers will be for the elevation of the laborer, rather than for the degradation. We will then connect cheapness with competency, and realize that the high-priced laborer, if intelligent and honest, will be the greatest producer. With this principle we can, with reason, ask our schools and universities to turn some of their energies to the preparation of our young people for intelligent work in our fruit industries. We can hold forth to them the hope of good pay for good service.

We welcome all of you. We welcome those of you whom we have known so long and esteem so highly. We welcome those who have come so far, and whose energies in behalf of the fruit industries never seem to tire. We regret that your convention does not sit in perpetuity, so that our welcome can be eternal.

Vice-President KINNEY in the chair.

ANNUAL ADDRESS OF PRESIDENT ELLWOOD COOPER.

LADIES AND GENTLEMEN: This is the Seventeenth Fruit Growers' Convention, and the thirteenth held under the auspices of the State Board of Horticulture.

When we met one year ago at San José, the fruit growers generally were in their best mood, having disposed of most of the fruit produced at reasonably good prices, and were encouraged in the belief that through-

out the State this industry was in a prosperous condition. This year has not been one so satisfactory, owing to the financial disturbances that have existed in every part of our country. Much depression has been felt; many losses sustained, yet we ought to feel thankful that they were not greater. The fruit growers have probably suffered less than those engaged in other industries. Our misfortunes should teach us this lesson, not to be forgotten, to avoid like disasters under like circumstances. Our fruit losses have occurred from the timidity of money, and the depressed markets. This brings me, first, to the necessity of our having a Bureau of Fruit Statistics. At the San José Convention a memorial was presented asking that a Bureau of Statistics be created, by established laws, with ample compensation to insure its effectiveness. This memorial was referred to a committee, who reported as follows:

SAN JOSÉ, November 18, 1892.

To the Fruit Growers' Convention:

The Committee on Legislation has the honor to report upon the memorial to establish a Bureau of Statistics, as follows:

In view of the importance of the question raised by the memorial and its novelty, it is deemed best that the subject have more thought and discussion than has been possible at this meeting, and the committee therefore recommends that the memorial be referred to the President of the State Board of Horticulture, with the request that he assign it as a topic for discussion at the next Convention of Fruit Growers at Los Angeles.

W. H. AIKEN,

Chairman of Committee on Legislation.

In this connection I refer you to my remarks before the San José Convention on the disposal of fruits.

Those who have kept pace with the events of the year must realize that something in the line of this memorial must be established. The discussions by the raisin growers, the prune growers, the orange growers will convince every thoughtful person that there must be unity amongst the producers, to avoid over-stocked markets and under-selling, also that the fruit growers must sell their own fruits. A Bureau of Statistics, with a competent statistician, could supply the necessary information to every branch of the fruit industry. With this information, the growers of like products could unite and determine how and where to sell their crops—haphazard shipments to a dull market will always be uncertain in the results. It is that we cease to make shipments with the risk of not getting proceeds sufficient to pay the railroad freights and expenses of drayage and commissions.

As a part or branch of this united fruit plan is the important question of fruit inspection. I refer you to my opening address at the National City Convention (Report of 1889, pages 329 and 330). I also refer you to the address of our Vice-President, in Report of 1891, pages 369 and 370.

Forest Culture.—I refer you to the address delivered at San José. I have nothing to add on this occasion.

Olive Culture.—At the session of the last Legislature an Act to regulate the sale of imitation olive oil was passed. This Act appears to cover every point. It is made the duty of the State Board of Horticulture and the State Analyst to enforce its provisions. Nothing, as yet, in the way of testing the requirements of said Act, has been brought before the courts. The State Board is now waiting the action of the State Analyst. The violation of some of the provisions is universal.

Vagrant Laws.—I refer you also to the San José address.

World's Columbian Exposition.—California has reason to be proud of the results of her efforts. She has shown to the world a part of her great resources, her capabilities. It will invite and secure for her an intelligent population, which will bring still greater prosperity to her people.

Railroad Transportation.—I beg to call your attention to the address delivered at San José.

IMPORTATION OF PARASITES.

In referring to this subject, and in order to bring the matter more intelligently before the great body of fruit growers, I will go back to the very beginning of the work of the State Board. It was organized on the 5th of April, 1881. Your attention is called to the first report, published in 1882. On pages 22 to 34, inclusive, will be found the essays of Felix Gillet. I had, at that time, been fighting insect pests by artificial means for about ten years; my experience with the black scale dated back about six years. At that time (that is, during the summer of 1881) it had not occurred to my mind that there was any other way (except by artificial means) to overcome the destructive ravages of the pests that were giving me so much trouble. I was impressed by the articles of Felix Gillet and the earnestness in his manner of presenting his views. He claimed that our modes and plans were all wrong; that we could not fight insect pests successfully except with their natural enemies. I quote a few lines from his essays:

"But to think that nothing short of an entomologist will make the insects go, and that the appointment by the State of such an officer would be the surest way of rescuing this land from the grip of that great pest, is, let me tell you, a mere delusion. See what has been going on in some parts of Europe for the last twenty-five years. What have they achieved there, with an army of the best scientists in the world, in fighting out these destructive pests that attacked their orchards and vineyards, and also in dealing against those maladies that devastated their cocooneries? Science, after proving a failure, left the field entirely to the practical men of the land—those who raised silkworms. At a time when there was no official entomologist they had their own way of fighting the destructive insects. To get rid of the common cabbage lice, which in certain years were becoming too thick around, they had the insect ladybug, which, both as a perfect insect or in a larva state, accomplishes an incredible consumption of plant lice. To go after the innumerable beetles, snails, spiders, worms, etc., that infested their gardens, and that bred thicker than was desirable, they had the toad, one of the most useful animals to be had in gardens, and which in some countries constitutes an article of commerce, being bought by gardeners to be let loose on their land; insectivorous birds were protected by law; animals like the land turtle, the hedgehog, and others were, with the toad, made regular members of the garden household, while an immense amount of insect hunting was done by hand. But this is an age of progress; all that has been changed, and in lieu of these primitive modes of fighting garden pests, we have entomologists, well versed in insect anatomy, and infernal drugs, from bi-sulphide of carbon to cyanide of potassium. Nothing is left to man but to imitate

nature, and getting hold of those insects that prey upon other insects, hurl them against the marauders that infest his land. Why, in fact, should not we raise predaceous insects to fight noxious insects? If we want to imitate nature, it is the best thing we could do. When we see what desolation and ruin are caused by insect pests nowadays in wheat, cotton, and other fields, in vineyards, orchards, and forests, I ask again, why shouldn't we take hold of such means as nature has placed within our reach in fighting them? Entomology may be regarded so far as nothing else but a 'negative' science, which is of very little help to us, for it is not so much the anatomy or Latin name of the noxious insect that we care for as its habits. To successfully fight all insect pests, the first thing we have to know is their habits, and all about their parasites."

With the foregoing quotation, I will leave Felix Gillet. As there were not many copies of the first report, it is important that some further record should appear in our horticultural literature to his credit, as being the first member to advocate this plan of overcoming the ravages of insect pests. Let it be ever to his credit. The wonder is that twelve years have elapsed with the loss of millions of money, and so little accomplished.

When we look back at the history of the struggles of the producers since the early settlement of America and learn of the various pests that have swept over the country devastating the farms and orchards in their march—whole neighborhoods having been reduced to want—the wonder is that something has not been done to prevent the return of like disasters.

We have seen intelligent nations in the past hundred years fitting out expeditions at great cost and expense in the pursuit of scientific knowledge in other directions—voyages to the north in search of the Polar Sea; expeditions to make observations in the total eclipse of the sun; expeditions to take observations of the transit of Venus, in order, if possible, to get the correct measure or distance from the earth to the sun, and thereby be able to measure everything else. In 1874 the United States Government sent out six parties, composed of a large number of scientists, with their assistants—three expeditions in the Northern Hemisphere, and three in the Southern—for the purpose as above mentioned. European governments did as much or more; no expense was spared in trying to obtain more accurate knowledge on this point. With this disposition to study and investigate, does it not occur to you as being most remarkable that intelligent races through so many generations have never sent out expeditions to search for parasites, the natural enemy of agricultural and horticultural pests?

Natural science or natural history takes first rank in the college curriculum, because it deals with, or takes cognizance of, the productions of nature, their relations to each other, and all the phenomena of life, both animal and vegetable; hence, this study is of paramount importance to the cultivation of the soil. No class in the great family of man occupies so important a position. If it is not prosperous and happy, certainly no other class can be. Accepting this statement as a fact, it therefore becomes the first duty of nations to prosecute an inquiry into the development of plant and insect life. It not only has an utilitarian purpose or object, but in no other way can the mind be brought into so close relationship with the thoughts of God and his creation.

The products of the soil are subject to greater mishaps than that flowing from any other line of business. It becomes our duty to assert ourselves and demand that a new policy be instituted, and that we have expeditions fitted out to every part of the world, investigating parasites and fungoids, so as to be prepared to meet the enemies that are now disturbing our crops, and any new enemy that may appear either to the farm or the orchard.

Life is too short for us to entertain any hope of obtaining such legislation in the United States Congress, so that we must rely upon ourselves. I therefore recommend the appointment of a committee to consider this question of establishing a permanent bureau to send out expeditions to search for predaceous insects, and to gather information generally concerning depredations either to farm or fruit products. Said committee could formulate a plan and present it to the next Fruit Growers' Convention, to be held in 1894, and, if ratified, to go before the Legislature of 1895.

There is no doubt in my mind but that some sort of a compromise could be effected as between the State Board of Agriculture and the State Board of Horticulture as to an adequate amount to be appropriated for this special purpose without increasing very greatly the present outlay.

To return to the first publication of the State Board, I call your attention to my essay—title "Disease of the Olive," Article No. 1—to be found on pages 35, 36, and 37, dated September, 1881. In that essay occurs this information, obtained from the best books I could find in Europe. I quote: "Bernard wrote on the subject in 1783 that there were no other writers before that time; that all the Roman authors of the first half of the eighteenth century were silent upon the subject. It was in 1783 that all the proprietors in some localities trimmed down their trees to mere trunks in order to clean them, and commence with new trees. It is certain that a malady so characteristic with such a disagreeable aspect could not have escaped the observation of authors. Abbe Couture presented a memoir to the Academy of Marseilles about the same time that Bernard wrote, in which he declared that the 'Coccos Oleo' was observed for the first time in 1781."

Lejourdan and Captain Cousin place the insect a few years earlier.

It was at the first meeting, held April 5, 1881, that I took a branch of an orange tree completely covered with *Icerya purchasi*, called white scale. No member, either of the Viticultural Board or Horticultural Board, at that time had seen this insect. I had traced it satisfactorily to my mind from Australia. It probably alarmed me more than any other one thing during my life's experience. I had planted a large number of fruit trees, was fighting other pests, and feared this, the most disgusting of them all. In my examinations at that time in my neighbor's orchard, I made this discovery: that nowhere could the white scale be found on the olive. Trees of the olive lapping into and adjacent to other trees badly infected were free, so that I felt more easy, still I never relaxed my efforts and determination to keep my ranch free from it. I cut down, as a precaution, all the acacia trees. When I found the scale on an orange or lemon tree, I at once had loads of straw hauled, spread over the ground under the infected trees, and put on fire during the hot part of the day. The trees were removed from the orchard without delay.

The articles as above quoted from the essay of Felix Gillet had made a deep impression on my mind. In my communication with my neighbor, Mr. Sherman P. Stow, he said to me that he had seen in an Australian paper, or quoted from one, this statement: "That the white scale might prove very troublesome to the California citrus groves, unless the parasite was imported with it." This circumstance, with others, determined my investigation of the subject. I wrote to the United States Consul at Melbourne, Thomas Adamson, Jr., who was a Philadelphian. We knew each other through a mutual friend. I corresponded with Baron Ferd Von Mueller and others on the subject. In 1883 Amos R. Little, a Quaker gentleman of Germantown, Pennsylvania, a Director of the Pennsylvania Railroad, who was on his way to make a voyage around the world, visited my place with his wife, and while staying with me offered to do anything in his voyaging that was possible to assist us. I took him in my buggy through the infested orchards, so that he could familiarize himself with these insects. I also gave him the plates, so that he could not be mistaken in the search. While traveling in Australia he reported that he could not find any such insect, nor could he learn anything about its ravages from the people to whom he had letters of introduction. This satisfied my mind that there was a parasite keeping it in check.

The writings of Abbe Couture and Bernard I accepted as facts as to the black scale. Olive oil had been made in western Asia and southern Europe probably for more than two thousand years, and as to the cause of the appearance of said insect in 1783, I commenced an examination. I had traveled through various portions of California during the spring and summer of 1868, and was impressed with the universal remark of the owners of fruit gardens, "That in California we have no insects." The peculiarity of Australian vegetation, which at that time was so interesting, made it desirable to have plants from that country in every household garden. Here was the nucleus to the whole pest question. As to how the black scale could have reached Europe on or before 1783, I traced it through, and it is possible and more than probable that it was brought over in one or the other of the voyages made by Captain Cook.

In a narrative written by himself (see Chambers, 3d vol., page 215, or in a more recent compilation edited by Chas. R. Lowe), Captain Cook sailed on his first voyage July 30, 1768; returned 19th of April, 1770, or thirteen years before the time mentioned as above. Sailed on the second voyage 13th of July, 1772; sailed on the third voyage, 14th of July, 1776. He had with him on the first voyage Sir Joseph Banks, President of the Royal Society, and Dr. Solander, a learned Swede, who was an adept in natural history.

On page 19 of Lowe's compilation, we find this statement: "Dr. Solander and Mr. Banks went on shore, and returned about nine in the evening with upwards of a hundred different plants and flowers hitherto unknown to European botanists." On page 23, the following: "On the 20th, Mr. Banks and Dr. Solander again proceeded on shore and collected a number of shells and plants hitherto unknown." On page 76, the following: "About four hundred species of plant life were found, all of which are unknown in England, except garden night shade, sow thistle, two or three kinds of ferns, and one or two sorts of grass." On page 86, the following: "The name of Botany Bay was given to this

place, from the great number of plants collected by Messrs. Banks and Solander." On pages 102 and 103, the following: "While busy in this survey, Mr. Banks was attentive to his favorite pursuit, and collected many plants he had not before seen." We find on their return home further reference as to collecting plants. (See page 119.)

We have abundant evidence of the large collection of plants, especially in Australia and New Zealand. Through these collections was transported to Europe the black scale, and perhaps other scales. The frequent communication by steamer from Australia to San Francisco and the great desire on the part of Californians to procure plants from that country was an easy and sure mode of introducing insect pests here. It is a matter easily to be determined that nearly all our pests were known in Australia before they were noticed here, and there is no doubt in my mind but that they were brought from Australia to California. When Fred C. Smith, of Australia, who was traveling in this State the past summer, to gain information in the cultivation of fruits, was on my place, he remarked that the black scale was known to him from his earliest childhood, but in passing through my orchards he remarked that he had never seen a black olive tree; that the olive trees were bright and generally loaded with fruits, much better than any of the trees I pointed out as having a good crop. I call your attention to the report on the "Importation of Predaceous Insects," made to the State Board of Horticulture by Albert Koebele, in 1891, page 15, *Aspidiotus aurantii*, "Red Scale." He says that this is the most numerous coccid upon citrus trees throughout Australia. "The Hon. Robert E. Scobie, of West Maitland, New South Wales, who is well acquainted with all insects affecting fruit trees, informed me positively that this same insect was very numerous fifty years ago upon his trees." That would carry us back in California to 1842. "Australia is in possession of more than enough natural enemies to keep the red scale (coccid) in check with ease." On page 16: "In another instance an orchard of some eight or ten acres, and about thirty-five years old, the proprietor of which always supplied sufficient manure, and kept the ground cultivated during the whole of its existence, had been infested with red scale as well as other scales, and yet but a very few trees along the border of one side could be found that showed any traces of them. The whole orchard within the thirty-five years had never been pruned, sprayed, or even washed, and yet I never met with in Australia a finer lot of trees, such glossy, deep green foliage, abundance of fruit, and so free from scales at the same time."

One more quotation and I will leave Koebele's report. See page 13, under head of Australia: "If once thoroughly known, the number of coccids and their enemies in Australia will be something astonishing, and it will be found that this country is the original home of many species that have spread over the greater part of the globe." This is the conclusion of a searcher and one who has made careful observations in the fruit orchards of that country. My conclusions on this point, which appeared in print several years before Mr. Koebele's first voyage, were formed from an entirely different source. From the study of history, no other country offers so much, or has such a wide field for this investigation.

Mr. Albert Koebele has been engaged by the Hawaiian Government to search for parasites to destroy the noxious insects so numerous in the

Sandwich Islands. He will leave in the proper season for Australia. I will make an arrangement with him in his searches to employ a competent assistant, so as to secure for us such other predaceous insects that might be advantageous in our fruit orchards. I am proud to say that the first money proffered to meet such purpose was by fruit growers of the San Gabriel Valley.

Prof. M. Rouzand, of France, has written a pamphlet giving the life history of a moth or butterfly, the *Erastria scitula*, a formidable enemy of the black scale on the olive. This book and the correspondence come through Mr. Arthur P. Hayne, who is engaged at the University of California at Berkeley. Mr. Koebele has written the directions how to get this moth to California, and we expect to receive the same through Mr. Hayne the coming winter. The translation from Professor Rouzand concerning this valuable parasite will appear in our next report. By this statement I do not wish it to be understood that there is any doubt as to the efficiency of the parasites that are already at work on the black scale; on the contrary, I wish to assert in this place that the *Rhizobius ventralis* and other predaceous insects now at work, will as effectually destroy the black scale as the *Vedalia* did the white; possibly it may take a little longer, as there are more than one hundred times as many black scales as ever there were of white, also it is more difficult of attack, as it is a harder substance. Right here let me say to you that so far as the black scale, the red and yellow scales, and the San José scale are concerned, the days of their ravages are numbered, but, acting on the advice of Mr. Koebele, we want to get numerous predaceous insects to prey upon all the scales that disturb our fruits.

I beg to call your attention to a pamphlet published by the State Board of Agriculture of Massachusetts, dated January 10, 1893. This pamphlet treats of what has been done to exterminate the "gypsy moth." In four years they had expended \$325,000 fighting this insect. The amount of money that said State Board has asked for for the coming year has not been stated. I had correspondence with these gentlemen through their Secretary, Wm. R. Sessions. I asked them to join our efforts to procure parasites, and that a very small portion of their last appropriation, which was \$150,000, would be required. The reply was that the money was a special appropriation, and that no part of it could be used in that way. Then I suggested that in their next demand it be stipulated that a certain portion be set aside for the purpose of searching for a parasite. I have not yet been informed as to the result. I have a clue to the natural parasite of the gypsy moth, and am making preparations to get it. In no other way can they successfully fight this pest, notwithstanding their opinion to the contrary. In their last letter to me they say: "The committee believe that as long as the effort for the extermination is continued it would be folly to expend money in importing parasites, as the killing of the pest would result in destroying the parasites living upon or within it." Very true. The State can reason in this way, on the ground that it is State money; but with our fruit growers, each orchardist must expend money out of his own pocket in the fight. For example, the cost of Mr. Albert Koebele's second voyage to Australia was \$3,712 18. I have expended a large sum in one single year spraying trees, and accomplished nothing, while the results of Mr. Koebele's voyage will save many millions to the fruit growers of the State. I quote from said letter: "The committee are yet of the opinion

that extermination is possible. If our Legislature continues to furnish the means, we intend to accomplish extermination if it is within the bounds of possibility." It is not within the bounds of possibility to exterminate it. The Legislature may continue the appropriation for a few years more, but eventually they will get discouraged at the outlay, and the fight will cease. The spread of the devastating insect will grow until some natural enemy will arrest it. The gypsy moth exists both in Japan and China, and may be brought into California, even with all the precautions we are taking. We have not \$325,000 to fight it.

No country has ever undertaken to exterminate an insect pest with more determination than did the British Government at Cape Colony. I refer you to the Biennial Report of 1887-88, page 160. This experience was with the *Icerya purchasi* (white scale): every plant, shrub, or tree was destroyed—the whole submitted to fire. Mr. Cillie, from South Africa, who was in California the past summer, studying our fruit industries, said that they cut down orange trees two hundred years old, and that after the destruction of plants and trees beyond the border, as they thought, of this insect, it was found in the forests more than a hundred miles distant in the interior.

The *Icerya purchasi* is known in that country as the "Australian bug"; the *Vedalia* as the "California ladybird."

But little is known, comparatively speaking, of the great assistance or the important work of the various ladybirds. There are, so Mr. Koebele reports to me, about fifty species in Australia that prey upon the various insects that disturb plants and fruit trees. About four years ago the walnut trees in my neighborhood were attacked by an aphid. It spread very rapidly and caused the trees, leaves, and small twigs to become as black as the olive tree from black scale. The walnuts were smaller, meat imperfect, and the nuts difficult to husk. It was to me quite alarming. Last year, about the picking time in the fall, I noticed spotted yellow ladybirds in considerable numbers on the trees. Early this spring and as soon as the tree put out its leaves (in our locality this takes place from the 25th of March to April 1st, and in full leaf about the 25th of April), the ladybirds were there in great numbers. On May 28th the second brood were hatching. I might mention, in this place, that while I had not observed in the previous fall but the ten-spotted yellow "ladybird," there were three different ladybirds, in about equal numbers, in the spring on the trees—the spotted yellow, the spotted red, and the common red. In my walnut orchards they could be counted by millions. I at once conceived the idea that they might be useful in other directions. I caught many of them and placed them wherever any species of aphid was at work. I noticed particularly that they devoured the aphid on the orange trees. I caught about one hundred of them and put them on an apple tree infested with woolly aphid. The following day not one could be found; they had flown away in search of more palatable food. Then I collected the eggs. I found the eggs very plentiful in the walnut orchards, mostly on the under side of the leaves, and in clusters of from twenty-five to forty in a place. I plucked two or three of these leaves and placed them in the crotches of two different apple trees, in places where the food was near at hand. The eggs hatched out three or four days after being placed there. The larvæ fed on the aphid, and increased in size very rapidly. I saw them picking up the woolly aphid and carrying it off, as you sometimes see ants carrying crumbs of bread. After

the larvæ had become full grown, they made fast and new ladybirds hatched out, which remained on the trees, and there was not the least vestige or sign of woolly aphis left. Here was the secret of the whole business. In the coming spring I shall have a cluster of eggs placed on every apple tree. This is a very simple thing to do. Once in the apple orchard, they will remain there as long as there is any food. The walnut trees this year had very little black on them; the fruit was good and easily handled. I sent specimens of these three ladybirds to Dr. Horn, of Philadelphia. When I know more about them, will report.

Some ladybirds are migratory in their habits. The *Leis conformis*, sent to me by Mr. Koebele from Australia, and which I have not seen for a long time, were found eighteen miles away; while others apparently have to be transported from orchard to orchard when not more than a quarter of a mile distant.

The fruit growers will have to reciprocate in the distribution of these useful insects, and by giving a little time and study in their management will find great gain in so doing. We have sent out about five hundred colonies of the *Rhizobius*; so that in the coming spring they will appear in great numbers in every locality where sent. There will be, as matter of course, some mishaps; and among the letters we have received on this point, I will read one:

FALLBROOK, CAL., October 2, 1893.

ELLWOOD COOPER, Esq., Santa Barbara, Cal.:

DEAR SIR: In the interest of those interested in the subject of colonizing ladybirds, I will make a report of my experience in that line.

I received the ladybirds on the 5th and let them crawl from the box onto the leaves of a lemon tree, there being twenty-seven of them, and they were very hungry and commenced work at once, by eating one scale in my presence and going to another, over which it stood, and when I went to it later the scale was gone.

I bound straw around the trunk of the tree to insure protection to the bugs, and took every precaution to insure success. On the 8th I went to the tree twice and could find only one bug, and on the 7th I went and could not find any, and when later on the same day I was riding by the tree I saw a swift (lizzard) on the trunk of the tree. It then occurred to me that the swift might have eaten the bugs. I succeeded in catching it after a lively chase. I then cut it open and found six of the bugs that you sent me, and a lot of partly digested insects which I took to be the same kind of bugs. If I had known that there was danger of swifts eating them I would have put tin around the tree.

I have colonized the twice-stabbed ladybird and find that an insect about two and one half inches long feeds on the larva. I don't know the name of them, but have heard them called "Johnny Cackpases." They have a head that turns in all directions; have large eyes and catch their prey with their fore paws or legs, and hold them tightly in their grasp while eating them. Also, I wish to state that the *Rhizobius ventralis* is the only kind of ladybird that I have been able to detect eating scale in its matured state.

Please send some more and I will try and make them a success.

Yours truly,

J. M. MACK.

We have received letters from parties who stated that they saw one beetle picking up six or seven young scales in a few seconds after being liberated from the box. One gentleman wrote that in his orchard were plenty of red scale, and that the *Rhizobius* was eating them by the thousands. Every person who reported (that is, those who watched the beetles carefully after liberating), declared that they went at once to work devouring scales.

One of our greatest enemies in apple and pear growing is the codlin moth. I would urge that a special effort be made to search for the natural enemy of this insect. Another destructive enemy, both to the orchard and the farm, is the grasshopper. The parasite for the latter exists in West Australia; has been known for many years, and can be obtained readily at a moderate cost. (See Annual Report, 1890, pages

89 and 40; also, Mr. Koebele's report to the State Board of Horticulture, pages 19 and 20.)

I have extended this subject in detail for the purpose of supporting my suggestion to have formed a permanent bureau to search for predaceous insects.

Regarding what is known as the Florida purple scale, recent reports of its spread in Southern California are very alarming. I would recommend the most radical measures in arresting its further spread.

In conclusion, I beg to call your attention to the importance of having stricter quarantine laws; no plant or tree that is not free from insect pests or fungoid disease should be permitted to enter the State further than would be necessary to make an examination. Let us in our efforts determine that no more pests shall get a foothold in California. The above is respectfully submitted for your consideration.

COMMITTEE ON RESOLUTIONS.

The President named as the Committee on Resolutions, G. J. Griffiths, of Los Angeles; A. Scott Chapman, of San Gabriel; William Chappel, of Duarte; H. A. Brainard, of San José; J. J. Pratt, of Yuba City.

THE PRESIDENT: The time for the morning's adjournment having arrived, according to the rules governing the convention, a recess will now be taken until 1:30 o'clock this afternoon.

XXI.

AFTERNOON SESSION.

The convention was called to order at 1:30 P. M. by MR. LELONG, Secretary, who said: I regret to announce to the members of the convention that the Hon. Ellwood Cooper, President, has been taken ill, and for that reason he will not be able to preside this afternoon. Hon. Abbot Kinney, the First Vice-President, will occupy the chair, and will be assisted by Mr. G. J. Griffiths, the Second Vice-President.

VARIETIES OF CITRUS FRUITS.

By J. E. CUTTER, of Riverside.

With the naming of this title the image of the gracious bulk and beauty of the Washington Navel fills the retina of the mind's eye, and we all say, "thou excellest them all." We next wonder if there shall be a future in fruits when another comer will depose this king. We freely admit, however, that his majesty has some very poor relations, which makes us tired, indeed! Your essayist believes that every Navel orange that is distinct from the Washington is inferior to it, though he has noted one at least that was both productive and excellent. From one source comes the claim that by a secret process of crossing, an "improved

Washington Navel" has been obtained. The fruit that has been offered in support of this has failed to show that it was other, or better, than can be found in the orchards of nearly every section; and, to date, the best specimens of oranges that the writer has tasted have been of the regular strain.

While the Navel is the best variety of its season, both orchardists and marketmen know the need of other kinds. Variety is wanted during the time when it is staple, and other sorts must supplement it. Later they must meet the full demand when the Navel's season is past. For the first of these two requirements the St. Michael and the Blood oranges are doubtless the best we have, and they also are the best immediate successors to it. They have been raised in but limited quantity, but growing favor is shown to both by dealers and planters. Both possess excellent shipping qualities and both keep well at a time when many varieties have softened too much for the best carriage. Both are productive, exceedingly so, and the Ruby Blood probably leads all varieties in disposition to early and heavy bearing. In structural characteristics the St. Michael is easily the most elegant of oranges.

Following these is the Tardif (French adjective *tardif*, meaning late), doubtless identical with Valencia Late. This is par excellence the late orange. It is good from May 1st to December, not only good, but better within those limits than any competitor. Its structural characteristics give it the best shipping qualities of any orange, while its crisp, sub-acid flavor—sprightly as a good soda—satisfies the craving of summer. It has a pale rind, while the flesh is of unusually rich, deep color. It is very productive and the tree is a very excellent, strong grower, with but slight thorns.

The foregoing cover the season and make the best list that will do so. There is, however, a long list of excellent varieties, of which some will contend strongly for place among the indispensable few. Prominent among these is the old established Mediterranean Sweet, which has always been profitable; but the Blood, St. Michael, and Tardif are all better fruit and better shippers, and the St. Michael and Tardif are better trees.

The Joppa comes with good credentials, and may yet win place among the especially valuable. Having never seen the fruit the writer is not competent to treat of it here.

In the Tangerine class, the Daucy's and Mandarin rate as standard. The best fruit of this kind that the writer has seen was raised by Mr. Abbot Kinney, of Lamanda Park, and by him termed the "Kinneloa."

Of varieties of pomelo (grape-fruit), there is much inquiry, and but little definite knowledge. As shipped by our Florida friends to the Eastern markets this fruit has found much favor. Of the different varieties probably the Triumph has been most planted in our State. Three years ago the writer received from Florida a very small tree of a sort said to be seedless. The "seedless" story was taken "with a grain of salt," but later a small stock was budded from the tree, which has not yet fruited. Meanwhile Florida papers have reported a "seedless" pomelo of unusual excellence, samples of which came to them from the same place whence the writer's tree was obtained. This, at least, gives good color to the repute which my own tree brought.

Several varieties of lemons have been found thoroughly good, but no one has been acknowledged *best* by general consent. How desirable it

is to determine the preëminence may be judged when we consider that our State gives promise to become the world's greatest lemon district, and that, as yet, we are but opening up the industry. One principle must guide us in this inquiry, to wit: that no lemon that is bitter of rind, whether little or much so, can be accepted. The so-called Sweet Rind, the Bonnie Brae, and others that may have gained some attention, but will not stand this test, must be discarded. Shipping and keeping qualities are also imperatively demanded, so that the Bonnie Brae also fails from its weak, loose, and insufficient rind.

Of the established varieties, the otherwise excellent but weak-growing Eureka is yielding ground, especially in the interior valleys, where its thin foliage fails to shield the fruit properly from the hot sun.

Sicily is a very indefinite term, which has been used alike as a name for some of the best and for some of the very worthless sort. The planter needs always to inquire, "What Sicily?"

Genoa is unmistakably a fine fruit, resembling Eureka, but the tree grows stronger and is of better habit. It has been but little planted.

The Eureka's long-time rival, the mighty Lisbon, still flourishes as the great contestant of all the new introductions. Its fruit is strictly high grade, and cures to the best keeping condition. It is very productive, but against this must be set the fact that it is late in coming into bearing. Its foliage is of light color, but growth is of the heaviest. We may add that when Mother Earth was bidden to bring forth thorns the Lisbon was no doubt there.

The Villa Franca battles with the Lisbon for growing favor on full, even terms. As an early and heavy bearer it probably excels all competitors. It carries few and light thorns. In the severe frosts through which it has passed in Florida it won the repute of being more hardy than other varieties. This seems to be sustained by experience here in December, 1891. Its fruit is judged with the best, both in our own State and abroad.

A late-comer now appears, which shall be more fully described after presenting in tabular form the results obtained in the laboratory of the California State University from chemical analyses of the best selected samples gathered from exhibits at the State Fair held in Colton in March last. The lemons analyzed represented most of the foregoing varieties, and were, so far as possible, selected by the persons in charge of the exhibits, in response to special request from the University, as made to the writer. No. 85 (Royal Messina) was picked in November, as also Nos. 88, 89, and 90. No. 87 (Villa Franca) suffered the disadvantage of later (January) picking, and the date of No. 86 (also Villa Franca) is unknown. No. 85 grew at Nordhoff; No. 86 at South Riverside, and the remaining Nos. (87, 88, 89, and 90) came from one grove in Ontario. In each number, two or more samples were used and averages taken.

	No. 85, Royal Messina.	No. 86, Villa Franca.	No. 87, Villa Franca.	No. 88, Lisbon.	No. 89, Genoa.	No. 90, Eureka.
PHYSICAL ANALYSIS.*						
Average weight, in grammes.....	119	105	110	110	105	105
Rind, per cent.....	25.2	19.1	25.0	29.6	28.5	28.5
Pulp, less juice, per cent.....	25.6	26.2	24.1	25.0	24.9	23.8
Seeds, per cent.....	0.0	1.4	.5	.4	0.0	0.0
Number cubic centimetres of juice, average.....	5.5	5.7	5.5	5.0	4.6	5.3
JUICE ANALYSIS.						
Solid contents by spindle, per cent.....	13.20	10.30	10.60	10.70	10.80	11.15
Total sugar by copper (inversion), per cent.....	3.46	2.12	2.27	1.56	2.44	2.70
Acid (citric), per cent.....	8.40	6.92	7.39	7.84	7.39	7.81

The foregoing analyses average richer and more uniform results than any previously reported by the University. The chemists state that they do not at any time obtain so high percentages of acid as have been reported from tests made by others at Los Angeles. For comparative study therefore the results obtained at each place must be considered by themselves.

The Report of 1891 (University) says: "The relatively large percentage of sugar is a feature that will further commend them [California lemons] to the consumer's taste." This was written of former analyses, but the percentages of three of the six samples shown in the foregoing table are higher than the best reported in 1891. All are good as they stand, except the Lisbon (sugar of), which is low. No. 86 was in an over-cured condition, which may account for an apparent deficiency of peel.

The most prominent feature of the "juice analysis" is the easy and extraordinary superiority of the Royal Messina. It shows *two and one fifth times* as much sugar as the Lisbon, together with decidedly greater strength of acid than any other of the list. In a previous test at Los Angeles it had also shown more acid than the Lisbon, though both were excelled in that respect by an over-cured Villa Franca.

The data obtainable from the foregoing table is the most valuable that chemical analysis has shown in this matter. We find that we have several valuable varieties to choose from. Of these the latest introduction is at once seedless and richest in general contents of juice, in sugar, and in acid. It is high in keeping qualities, the writer having found its fruit sound, and pliable of skin, over eight months after picking the same. The tree is very nearly free from thorns, strong of growth, and of dark and elegant foliage—the best tree yet, so far as observed. It was introduced into this State but four years ago, and its value not being known, it was not pushed until it had time to fruit. Therefore, but few are yet in bearing, but thirty acres were this season planted to it in one grove in Riverside.

I wish to say with regard to the percentage of juice that it was probably due to the slight differences in the curing of the several samples. Whichever samples chanced to be the least cured would stand a fair chance of presenting the highest average of juice, and would compare, consequently, to a disadvantage, but a little more curing would have

* See protest entered by James Boyd.

brought it down to the same point with the others. However, the averages are there as determined by the chemist of the University. The absolute number of cubic centimetres of juice should not be taken, but the comparative quantity.

DISCUSSION ON VARIETIES OF CITRUS FRUIT.

QUESTION: Is it the percentage or weight in cubic centimetres?

MR. CUTTER: That is absolute, it is the quantity; the Messina showing $5\frac{1}{2}$ centimetres; the Villa Franca, $5\frac{1}{7}$ centimetres. When we come to the juice analysis, everything is expressed in percentages. It is in the juice analysis that our greatest interest lies, and while the final analysis represents the value of the lemon for commercial handling, we now, in the juice analysis, get to its value for use. If we were to consider the juice as simply so much pure water, then every one would be exactly alike, but the juice which carries the most of acid and sugar and solid substances will be the richest and heaviest, and therefore the highest percentage of juice will necessarily indicate superiority. The Royal Messina is reported from where it is coming into fruit, that it grows stronger than some of the other high grade varieties. It grows to foliage, and carries its fruit well inside the branches. All of you who are raising lemons, especially in the interior, will appreciate the value of that circumstance.

MR. BLANCHARD: Mr. Chairman, I would like to ask Mr. Cutter if the Royal Messina is generally seedless and the tree thornless. I would also like to know its origin, where it came from.

MR. CUTTER: With regard to its being seedless. It is much the same, in this respect, as the Washington Navel. You know you have found seeds in the Washington Navel, and I have found a seed or two in one, two, or three samples of the Messina. As a rule, I have found it seedless. As to the origin I do not know. It came to us under the name of Sicily, about four years ago. A small stock came from a shipment of trees from Florida. For want of a name, I gave it the term Royal Messina, identifying it with the one that was reported to me so favorably from Florida. Whether Royal Messina is the true name or not, I should still adhere to this and shall introduce it to the public under that name. The tree is nearly thornless. As I said in the paper, it is also a strong grower. The foliage is dark and the tree is of elegant habit. The Villa Franca had apparently shown a greater power to resist frost than other varieties—than the Royal Messina. I would not, therefore, rate it as hardy as the Villa Franca, but I believe the Villa Franca is entitled to the credit of being hardier than any other lemon in this respect.

MALTA BLOOD VS. RUBY BLOOD ORANGE.

MR. BOYD: I would like to ask Mr. Cutter whether, in speaking of the orange, he includes the Malta Blood, as well as the Ruby Blood. And whether he finds that there is a difference in quality between the Malta Blood and Ruby Blood. I am informed by competent authorities that while the Ruby Blood has advantages in point of tree, the Malta Blood is as superior in point of fruit as the Australian Navel.

MR. CUTTER: I cannot agree with Mr. Boyd in that matter of the

superiority of the Malta Blood. I have never regarded the Malta as of so fine a quality as the Navel, and although I recognize it as good, I have found many times something peculiar in regard to the flavor that did not exactly suit. In regard to the Ruby, I want to say that some of the best oranges I have ever tasted have been the Ruby Blood, and they have all been young fruit, and they all show the unevenness which is found in the fruit of young trees. However, I have found that often a Ruby is of the very highest character, and its flavor is better by far than that of any Malta that I have ever tasted. It has not, so far as we have had a chance to know, shown the same evenness of the color as the Malta Blood does in the old tree that we had, but whether it will attain that stage or not I leave you to judge from your own experience. The Ruby is certainly, in a good specimen, one of the most delicious oranges.

MR. BOYD: I would like to say, by way of explanation, that my information comes from the owner of one of the leading packing-houses, who, in conversation, informed me that the Malta was a far superior orange, so far as they had seen; that the Ruby was irregular in size and in appearance, and was not equal to the Malta. The Malta was a much better bearing orange, thinner skinned, and in every respect superior looking.

MR. CUTTER: In tests made at the Colton Fair last year, when we came to the Blood orange class, the Blood orange that rated highest and took first premium was a Ruby Blood; the second was a Malta Blood, and some of the Ruby Bloods did not come up to the level of the Malta Bloods, but one of them got ahead. And that would seem to confirm what I said before about the unevenness we may expect from the products of our orchards when they are young.

ENTERTAINMENTS.

THE CHAIRMAN: Gentlemen, it has been said that "all work and no play would make Jack a dull boy," and perhaps it would make us so. We have some correspondence here in reference to the play part of this convention, not strictly play either, because we cannot make the excursions that are proposed without gaining a great deal of information. The Secretary will read the letters that he has.

The Secretary then read letters of invitations to excursions, which had been sent to the convention. They were accepted.

On motion, Mr. Lelong was made a member of the Reception Committee.

THE CHAIRMAN: The next paper on the programme is an essay on "Transportation," by Mr. Berwick, of Monterey.

TRANSPORTATION.

By EDWARD BERWICK, of Monterey.

At the last convention of California horticulturists, held in San José, there seemed a prevailing impression that horticulture in this State was sick. It was called a case of over-production; its symptoms, local congestion, threatening to result in dropsy.

Now, they say that "every man is either a fool or a physician by the time he's forty." Nature stamped her forty mark on me many years ago; so, having to choose between being the fool or the physician, I decidedly prefer the latter. This being the case, I, of course, undertook to prescribe a remedy for sick horticulture. My theory of medicine, and I hope yours too, is that "an ounce of prevention is worth a pound of cure." I told the San José Convention that the way to prevent dropsy in their patient was to maintain a good circulation; and that the way to keep up this good circulation of California fruit in Eastern and European markets was to increase and improve our transportation facilities and to put transportation on a right, just, and firm basis.

I presume you all agree with me thus far. One word may divide us: the word "How?"

Before I propound my method I want most emphatically to assure you that I have no sympathy with anarchy; that I am no incendiary, and that I value my own property too highly to advocate the confiscation of another's. Nor do I cherish any animosity against any member of any corporation. On the contrary, I have intense respect and admiration for the enterprise and energy exhibited by the builders of our pioneer railroads, those monumental works of the nineteenth century. I have no wish to under-value or belittle their achievements, and no desire to deprive them of one jot of their just reward. The builders of the Southern Pacific Railroad system (Heaven rest their souls!) are almost all dead, but California fruit growers should never forget that Mr. C. P. Huntington and his late associates rendered possible that present vast development of horticulture, which to-day is the pride and glory of our State.

I am not going to trouble you this afternoon with any bustling array of transportation figures. That's our main trouble already; transportation figures are too many and too big—much too big for the amount of transportation. You can sum up transportation figures and the whole present transportation system in five short words—words too familiar to all present, "all the traffic will bear." You know what that means—"all the producer will bear;" and this frequently amounts to "all the trees will bear."

It means that rates are based, not on any computation of the cost of transportation, but are classed under an arbitrary, elaborate schedule, which shall shear the producer as close to the skin as possible. Here is how the ascending scale is graduated for running a ten-ton car a distance of 125 miles: Hogs, \$25; cattle, \$32; wheat, \$32 50; hay, \$40; apples, \$48. Then stove wood, say rough oak, is \$2 75 per cord, and ten cords make a carload; while peeled oak is \$3 15 per cord, and eight cords make a carload. In one instance under my notice lately apples were sent to a point east of the Rockies for \$1 per hundred, while pears were \$1 25 per hundred. Some articles even appear twice on the schedule at different rates. Millet as bird feed is some 25 cents per hundred more than as seed.

Such a system can never become very satisfactory to the horticulturist. "You fatten the ox and I'll eat the beef," is certainly a division of labor; it can hardly be called equitable.

But such is the system that has obtained, and will obtain, so long as private ownership of railroads is tolerated and human nature remains human nature. As I said, the founders of the Southern Pacific Railroad

are almost all dead, but their heirs, or their heirs' heirs, are with us, and are here to stay. Their system also stays with them, and will stay so long as the people permit it.

What does this all mean but that you are to be the eternal bond slaves of a vast corporation, which will allow *you* the right to live and work so long as *they* reap the harvests that your toil has won. Is this to be the outcome of the great American experiment? Let us face the alternative boldly! Do the people exist for the benefit of the railroads, or the railroads for the benefit of the people? Shall the railroads own the people, or the people own the railroads?

Now, at our San José Convention I had the honor of presenting a resolution, similar to one I will hand to your Committee on Resolutions here, to this effect: That, in the opinion of this convention, the best interests of California horticulturists, and of the American people, demand the nationalization of American railroads.

The time for discussion was then quite brief, and the convention negatived the motion, although our worthy President, in his opening speech, had commended the plan. Probably the majority of that convention momentarily failed to recognize certain facts. Notably they failed to realize that our railroads are merely the nineteenth century evolution from and extension of common highways; that *railroads are in reality the common highways of to-day*, and should be so considered and treated. Railroads bear the same relation to the civilization of to-day that common highroads bore to the civilization of our fathers. Products are carried at least ten miles in railroads for one mile on common highroads.

That San José Convention failed to realize that commerce is the life blood of a nation, and railroads the arteries where the tide of commerce ebbs and flows. It failed to realize that a man might as well trust the circulation of his heart's blood to the control of a vampire as a nation permit its commercial arteries to be controlled by an incorporated company. In both cases such action would be sheer lunacy, and equally suicidal.

Had our statesmen been wise, and foreseen that the railroad was to be *the highroad* of the future, they would have made the building and control of railroads at least as much a matter of governmental care as are common highroads, and there would be now no need of any apparently revolutionary policy.

But is there aught revolutionary in the nationalizing of railroads? I claim there is nothing.

It has ever been one of the first functions of good government to provide means of intercommunication among its citizens. The government of old Rome is remembered to-day by the monumental excellence of its roads and viaducts. If old Rome could furnish its citizens with roads of then unparalleled durability and utility, surely vigorous young America can provide its citizens with the very best class of roads known to this nineteenth century.

Some will shake the United States Constitution at me and tell me the nationalization of roads is unconstitutional. I boldly deny any such assertion. But should every lawyer in America dissent from my view I would then claim that "*man* is more than constitutions."

The founder of the Christian religion announced that "the Sabbath was made for man, and *not* man for the Sabbath." This I would para-

phrase to-day and say "the Constitution was made for Americans, and not Americans for the Constitution."

The welfare of this republic is the highest law, and any lower law conflicting with that welfare must stand from under.

Our ideas of what is constitutional are subject to very rapid change. Let me cite you an instance from the "Review of Reviews" of just such a rapid change in the mother country. Only last June, in the British Parliament, Mr. Gladstone, "and with Mr. Gladstone the House of Commons, woke up to the discovery that what had previously been declared to be impossible, unconstitutional, and most inexpedient, had now become so obviously desirable that *not a single* hostile vote could be registered against the motion."

The motion in question was the desirability of accepting the offer of the American people to conclude a permanent treaty of arbitration for the peaceful adjustment of any and all future difficulties.

Now, I will venture to say that when the question of the nationalization of railroads shall be fairly and squarely put before this great nation, there will not be found in our national Congress a single dissentient voice.

Then we were told, I believe, at San José, that the country was not ripe for this measure. Friends, did you ever know of any reform that, in the opinion of our political spoilsmen and party hacks, the country was ripe for?

There is a far feeblér branch from the Anglo-Saxon root, that, with a fifth of our age, and a fifteenth of our population, found itself ripe enough years ago to build and control its own railroads; but it has for its motto, "Advance, Australia!" Shall our motto be "Hang back, America!" or "Go slow, California"? What is possible to such weak sister republics as Chili and Brazil, is surely not impossible to the foremost, the pattern republic of the world.

Another of the so-called facts stated at San José was that this nation was too poor to own its railroads. Let me again point to Australia. Australia was long since rich enough for the enterprise, and found the venture both pleasant and profitable. Are the United States of America less wealthy than the colonies of Australia? Are they less capable?

This great nation spent lives by the myriad and treasure by the billion to free its black slaves; shall it grudge its dollars to prevent the enslavement of its white citizens? We incur a loss of \$100,000,000 annually because of pauperism and insanity now present with us; surely sound policy demands, and amply justifies, such wise expenditure as shall prevent our citizens from being plunged into the depths of poverty, or fretted and worried into the awful abyss of insanity. It *cannot* be that America should plead poverty in a matter so vital, when an old tax-impoveryed country, Germany, where every toiler carries a soldier on his back, can find means to own its railroads.

If there be one object for which our people would cheerfully endure heavy taxation, it would be this; that in this government of the people, for the people, and by the people, the railroads should be the work of the people, operated for the people, and owned by the people. But, with wise management, there should ensue an alleviation rather than any increase of taxation. Such has been the case in Australia, why not here likewise?

The first step in national advancement is to *know what we want*. As

I heard one of our wise men say the other day, "The world makes way for the man who knows whither he is going." Neither political party seems to know just now what it *does* want, or whither it is going, except that both are always as unanimous as Jonah in the whale in wanting and going to loot the treasury.

Let this convention make up its mind what it wants; that it wants the nationalization of railroads; then want it hard, and keep on wanting till you get it. Ask and ye shall receive. Do you say there are lions in the way? There always are, always will be. But advance you boldly. They will retire, or you will walk right over them.

Pull together, and keep on pulling together. Don't be put off by such straw lions as the words "unconstitutional," "impossible," or "inexpedient." "Quit you like men; be strong." That is *expedient* which the welfare of the republic demands. That is *possible* which Americans resolve shall be possible. That is *constitutional* which this mighty nation makes constitutional.

Once more, friends, know what you want! Don't let your party leaders fool you into hostile camps wrangling and snarling over the dry bones of dead issues, or the tweedledum and tweedledee of tariff niceties. Truth is one! Choose for your leaders men of convictions, and men with the courage of their convictions. Your present railroad system antagonizes and insults republican institutions; it aggravates class distinctions, debauches politics, defies the law. You claim to be the sovereign people. Prove your claim! Be once more sovereign! Issue your unanimous sovereign mandate, shake off your shackles, and be once more free Americans, worthy of your sires!

CALIFORNIA DRIED FRUIT EXCHANGE.

By E. F. ADAMS, of Santa Cruz.

What I shall have to say will relate wholly to the marketing of dried fruits, of which only I have any such knowledge as would warrant my taking the time of this assembly. The conditions in this branch of our industry are entirely different from those attending the marketing of fresh fruits, either citrus or deciduous, which are sold by different methods, through different channels and by different people. Including raisins, the proceeds of our dried fruits considerably exceed the proceeds of all other fruits and fruit products of the State, wine and brandy included, and the ratio of their greater volume is likely to increase. The importance of the subject is therefore sufficiently apparent.

I shall speak in advocacy of coöperation in marketing, and, as I have had some experience in organizing coöperative fruit-marketing associations, and as these papers are printed for general circulation, I shall not hesitate to begin with the statement of some elementary facts and principles, with which possibly all here are familiar, but which I have found actually new to large numbers of orchardists.

For example, I find that most orchardists think little of any "market" beyond the local buyers whose agents visit their orchards to buy their fruit. Their product, when it leaves their farms, so far as they are concerned, seems to vanish into space. By what routes, and to whose profit it finally reaches the tables of those who eat it, they seem mostly to

have given no thought. As a matter of fact, our product, in the hands of the local buyer, is no nearer market than it was in the hands of the grower. When the local buyer gets it he has to do what the grower might have done for himself—find a customer for it. The market for our dried fruits is with the wholesale grocers, who, through the retail trade, distribute substantially all our dried fruits to the consumer.

Right here let me say that many growers, enthusiastic for coöperation, believe that we should ignore wholesale men and sell to retailers direct. I do not wonder that growers, unfamiliar with mercantile affairs—and it is no more to their discredit to be ignorant of mercantile details than for the merchant not to know how to prune an orchard—should suppose this to be desirable. I will therefore state just why we cannot do it.

Retailers do not buy in carload lots; the overland freight on less than carload lots is prohibitory, and always will be. Hence, selling to retailers involves the maintenance of expensive Eastern agencies selling one article alone in competition with other established firms selling everything the grocer buys. They could eat us up, and would promptly do it. Every wholesale grocer whose field we should invade by seeking his customers would drop California fruits like a hot poker, and put all his strength on imported goods. We could not possibly reach a quarter of the retailers, and, for the portion of the trade we could get from those we did reach, we should lose the trade of all the rest so far as the wholesale man could accomplish it.

Retailers buy on credit. For the most part they will not, and, in fact, cannot buy otherwise. Coöperative concerns must sell for spot cash, as credit involves inevitable losses, which coöperative concerns must not risk. Peddling goods to retailers can only be done at a loss, and will never be tried. Sell to whoever will buy in carload lots, and let that end it.

Our market, then, is with the wholesale grocers. The question is how to reach that market with the least charge on the goods. The answer is simple and obvious. Concentrate our fruit, under our own control, in such quantities that we can fill any order in any amount, of any variety or size desired, and sell it to them. There is no mystery and no difficulty, except the securing of capable men to manage the business effectively and economically, which can always be done by proper judgment.

Commissions on dried fruits are usually 5 per cent. This involves pay for two distinct and entirely different services—first, the concentration of the fruit from the orchards into carload lots at shipping points; and secondly, the finding of wholesale grocers to buy it. The first service is performed by the active young men whom we all know at this end of the line, and the second by another set of equally active young men, whom we never see, at the other end. The commission-house pays both sets of young men out of its 5 per cent, together with telegrams and traveling expenses, and takes the balance for profit. I do not think the rate too high, nor the possible profits unreasonable. We can, however, save one half of it by concentrating our own fruit; but out of that we must pay the expense of concentration and our own telegrams. Out of the whole we ought to save say 1 per cent, which is probably about the usual profit in the commission business.

I have described the commission business as it theoretically is. If all our goods were practically sold that way, possibly there would be no

adequate reason for coöperation; and yet, after all, there is one fundamental and irremovable objection to it—by this means we intrust the selling of our goods to those who have no interest in maintaining prices; on the contrary, as it is usually more difficult to find customers than to find goods for sale, all commission men are bound to sell to customers just so cheaply as they can without absolutely losing the confidence of consignors. So long as they are not obviously underselling they do not care a rap whether the fruit goes high or low; neither, in fact, does the wholesale merchant or the retailer, who only care that no competitor buys cheaper than they. The only parties really interested in prices are the consumers, who naturally wish to buy as cheaply as possible, and the grower, who quite as naturally wants all that the traffic will bear; so that I am not sure that even if the commission business were conducted in an ideal manner it would not pay roundly for the growers to combine and assist in fixing prices for their own goods.

But the commission business is *not* conducted in an ideally honest manner; far from it; it is rotten from end to end, and the primal reeking curse of the thing is that every man, woman, and child engaged in the commission business is also a buyer on his own account, and no human being was ever so constructed by nature or reconstructed by grace as to sell other people's goods squarely and honestly in competition with his own.

There are, I think, in the commission business, men as upright and honorable as I have ever known, but I do not think them equal to this strain; and, if some of them are, we know that there are also among them, as among all other classes of business men, a certain number of very dirty people, and how shall the grower distinguish?

The existing abuses of the dried-fruit trade are about as follows:

1. The grower is utterly uninformed at the beginning of each season of the real value of his product, which will be determined by the amount in stock left over, the prospects for new crops, not only in this country but throughout the world—all fruit crops of all varieties competing with all other crops—and the financial condition of the country.

2. Under this state of things, it is entirely easy, and believed to be common, for a few large operators to make early sales, either real or fictitious, of "futures" at very low rates, causing these sales to be telegraphed back here with the most terrifying accounts of prodigious fruit harvests impending everywhere.

3. Upon which local buyers, often, and probably usually, supplied with funds by the men who have made the short sales, start out to hunt for growers in distress for money, from whom, by the temptation of a good advance paid then and there, they can buy his fruit fresh at rates which will enable the low-priced short sales to be filled at a round profit. A few short sales made East at low rates and a few purchases made here under financial pressure at still lower rates, and the thing is done. The price is set at both ends, and the growers, except the few strong men who can wait till their weaker brethren have sold out, are helpless. And a little later, when the season has advanced and all the cheap goods have been found out and taken into camp, these same men will send their agents seeking consignments to sell in competition with the cheap goods which they have bought and own; and these consigned goods, upon which liberal advances have been made, they take East, where interest and storage accumulate, and one after another the wearied

growers let go and write the agents to sell for what they can get. At the present time there are probably 500 carloads of consigned prunes alone in Eastern cities, and I know not how many of raisins, which the astute buyers at that end know perfectly well are their meat at their own price if they will only wait a little, and that is why we are having a hard market for dried fruit f. o. b. The worst thing to be done with dried fruit is to consign it East. Its proper place is in California until it is sold.

We have endeavored to meet these conditions in Santa Clara County by organization, concentrating our own fruit and selling it, at the same time giving great publicity to the facts affecting prices, and so enabling each grower to judge for himself of values. We have not revolutionized the market, but we have enormously steadied it. The Santa Clara County Fruit Exchange has sold about \$300,000 worth of dried fruit, and will probably handle fruit to the amount of a half million during the year. Other organizations there, working not through us, but in harmony with us, will probably handle half as much more. We have gone a great distance to make improper transactions in fruit impossible, but we have not altogether succeeded; we have too many cheap goods to compete with. In the early part of the season our worst competition was from the south. Knowing positively as we did the shortness of the apricot crop, it was impossible for us to get even 8 or 9 cents for good apricots, when growers here at the south were taking from 5½ to 7 cents for apricots as good as ours, and as our people had to have money we let them go; but it made our hearts bleed, and we registered a vow to come here before the next season and implore you southern people to join hands with us for our mutual good. And it was no new thing. In 1891 apricots were selling in Ventura County, fresh, at \$15 per ton, when they were selling in Santa Clara County for \$50 per ton; and the freight and waste of the Ventura fruit to suitable drying-ground could not have exceeded \$5 per ton. Just now our worst competition is consigned goods, and we look for no improvement until they are closed out, and we want you here to join us in stamping out that practice, ruinous alike to the consignors and everybody else.

The method which we propose is by the establishment of a State fruit exchange, somewhat on the lines of the Santa Clara County associations. We desire you to concentrate your own fruit by means of local associations, and when so concentrated, while retaining control of the prices, unite with us in establishing one general agency to find customers and distribute information. The proper distribution of information will render it impossible for buyers to get fruit, except from the most ignorant, much below its value, for all growers, when properly informed, may be depended upon to get all they can for themselves. But that is not enough. Growers must not only be informed of the value of their product, but must have a way provided to get that value. We have had experience and we know how to do it. It is not by abusing the middlemen, or cursing the railroad; it is by uniting and acting. Fruit growers of California, shall we unite and act?

A moderate estimate of the result of the work of our Santa Clara associations is that, by the information which we distributed and the steadying influence which we have exerted on the market, we have saved to the people of our own vicinity a quarter of a million of dollars, and to the State at large not less than a half million. If we will all

unite we can double the record, and once more I ask, shall we proceed to do it? The State Horticultural Society, a body of earnest and successful fruit growers, has taken the lead in the matter and caused the formation of a State exchange. We, who were intrusted with that duty, did not hesitate to act, knowing that the time was all too short for what is necessary to be done; but the body which called us into existence, although respectable, is limited in number, and we feel that the organization should really represent the whole State, and that representatives of the whole State should select men in whom they have confidence to go on with it, and to this end a State convention is to be called to meet on the 29th of December, to indorse the act of the State Horticultural Society—which it is not doubted that they will do—and to select the men who shall serve as Directors for the year 1894.

It is my hope that this subject will be deemed of such importance as to warrant reference to a special committee of fruit growers, instructed to report thereon at an early point in our sessions, upon our plans for a State exchange, so that, should they meet the approval of this convention, they may have the advantage of its indorsement.

REPORT ON THE PERKINS PROCESS.

The committee appointed at the late meeting of the State Horticultural Society at San José, for the purpose of considering and reporting upon the process of preserving fruit in storage and in transportation, invented by Rev. A. T. Perkins, of Alameda, have thought it best to form two sub-committees, each to report upon the subject-matters with which they are specially familiar. The first portion of this report, therefore, refers more particularly to the general and scientific aspects of the question, while the second relates to the application of the Perkins process to railroad transportation.

REPORT OF PROFESSORS HILGARD AND SMITH, ACTING AS A SUB-COMMITTEE.

The process embraces two main points, to wit:

First—The longer preservation of the fruit by the effect of a slow current of air having a minimum temperature of 55° to a maximum of 65° Fahr. passing continuously over it.

Second—The maintenance of this temperature at all times in the hot desert as well as in cold winters by appropriate means not involving the use of ice, the refrigeration being accomplished by the expansion of compressed air.

The committee have not had the opportunity of witnessing the process in operation, and as regards the results must rely upon the statements of Dr. Perkins (the correctness of which they have no reason to doubt) and the testimony of one of their number, Professor Smith. The efficacy of a current of reasonably dry air in promoting the conservation of fruit so as to insure its arrival in good condition, even after a considerably longer transit than now commonly occurs, seems thus to be placed beyond doubt. Fruit thus conserved has the additional advantage that upon arrival at destination it will not, under the influence of moist air, become covered with condensed moisture, as inevitably happens when it has during transportation been maintained at a low temperature by refrigeration with ice. That such bedewing of the fruit is highly injurious to its keeping quality is well known. The Perkins process apparently obviates this difficulty and leaves the fruit to arrive and remain perfectly dry. It is but reasonable to suppose that its life will thus be materially lengthened while in the hands of the dealer and consumer—an advantage which it is difficult to overestimate, especially if, as is claimed, fruit to be thus treated may be more fully matured at the time of shipment.

As regards the second point, viz.: the maintenance of the air current at the uniform temperature of say 55° to 60° without the aid of ice, even in the hot desert air, there is no question that it can be accomplished by the means claimed, viz.: the compression of air by means of a pump. Then, after giving it time to cool down to the outside temper-

ature—say 120° at most—allowing it to expand under proper conditions, reducing its temperature, and therefore that of the air current, to 55° or less. The proposition is theoretically sound, and it seems possible to make it practically feasible with perhaps only a slight addition to the weight of an ordinary car in the way of reservoirs and minor appliances, the exact arrangement, size, and form of which must be determined by experience. As regards the maintenance of the same temperature in winter, there can be no difficulty about making the same appliances answer the purpose of heating by the addition of a steam coil or otherwise.

We are, therefore, of the opinion that this invention deserves the most earnest consideration on the part of the fruit growers, transportation companies, and all interested in the fruit industry, since it appears to offer a simple and (as compared with the ice-refrigerating process) inexpensive solution of the problem both of cheaper transportation and of better conservation of fresh fruit for the Eastern and perhaps the European markets.

E. W. HILGARD, Chairman,
University of California.
EMORY E. SMITH,
Stanford University.

THE PRESIDENT: Mr. Chamblin, of Riverside, who is now in the room, has considered and labored about the orange growers in this section, and we would like to hear from him on this subject.

ADDRESS BY COL. T. H. B. CHAMBLIN, OF RIVERSIDE.

GENTLEMEN: I had hardly expected to stand before this convention to-day. My time has been pretty well occupied for several weeks, and, in fact, months, in the matter of organizing the orange growers of Southern California upon lines of marketing their own fruits. I recognize the fact that Southern California, particularly, is a peculiar country—peculiar in soil, in climate, in product. I recognize the further fact that the people of Southern California are a peculiar people, ever zealous in the work of building up and maintaining the reputation of their respective localities. I recognize the further fact that, in certain respects, orange growers, to say the least, deserve a place in the front rank of men for certain remarkable peculiarities. It has been their custom, in times past, to advertise to the world the immense profits in their line of business—a proposition, gentlemen, which stands almost without a parallel in the annals of business and trade. A further remarkable peculiarity has been, that after having invested their thousands in a ranch, after having planted their trees and spent long years of patient waiting and toil to bring their orchards to a bearing condition, and then after having matured a crop, upon which they were wholly dependent for their income, they turn it over, almost indiscriminately, for some one else to dispose of at their own good pleasure, and give them what they might think best. This has been the course pursued.

Now, upon the first proposition, they were not so much to blame, for the reason that many of them, like myself, came to this country seeking for health, either for themselves or for some member of their family; and having been partially restored, they were only too anxious to make known to their friends in the Eastern States the favorable conditions of this climate, and only too anxious to have their friends come and locate near to them. I have a particular love for this Southern California, in that it has given me an additional and unexpected thirteen years of life.

Upon the second proposition, they have been, in the main, engaged in the activities of their ranch and have not been brought face to face with the possibilities of marketing their own crop. But, we have reached a

condition of affairs, gentlemen, that forces us to cast about us and take other methods for taking care of the products of Southern California. And what I may say concerning the orange crop of Southern California, I think will be equally applicable to all kinds of California fruit, particularly the fruit industries of this favored section. In considering this proposition, we find a few features that are absolutely essential in order that we may succeed. The first matter is making absolute provision for the grower, to the end that his crop shall be properly marketed. We must set him at rest, particularly in the matter of marketing his crop. Second, we must give him assurance that his crop will be marketed on the basis of equality with that of his neighbor; and third, that he will receive for his fruit, of like grade and quality, as good a price as his neighbor. With these conditions we set the grower at rest. In our orange growers' organization, we undertake to provide for them by operating upon a united basis.

What I propose to outline now, gentlemen, is a matter of practice, not theory, but of actual experiment. First, we make provision that the fruit shall move from the orchards of the grower embraced in the different associations, upon a pro rata basis; that one grower shall deliver for market an exact proportion of his fruit to that of his neighbor. Second, we propose that he shall receive the same price that his neighbor receives, and that, in addition to that, he shall receive the full average market price for an entire season. To that end we are organizing local associations in the orange-growing districts of Southern California, in which the growers have organized upon a mutual basis, usually taking the form of incorporated bodies. They establish a brand of their own, that is purely local in character, without individual or company names attached. We propose, under this plan, to absolutely place the marketing of the crop in the hands of the growers upon a basis that will perpetuate itself, and in the belief that no individual or company of men shall in any sense have any grip upon the product. Therefore, we say to these local associations: "Establish for yourselves a purely local brand, without any individual or company name attached." The business of the association will then stand under the supervision of the growers themselves directly.

Having established these local associations, we then say to them: Make preparations for the packing of your own fruit upon a line that shall secure the packing and the marketing of the fruit for cost, either by erecting or renting (as they may choose) a packing-house, purchasing their own material, employing their own help, preparing their own fruit for market.

We then provide, further, that upon delivering fruit each man respectively shall receive from the manager of the association a ticket setting forth the number of loose boxes delivered. The moment that fruit goes into the packing-house it loses its identity. We pack the fruit during the season, and at the close of each day's packing we weigh the culls of each variety, and having gone through the season, we then ascertain the gross amount of deliveries, and deducting the percentage of culls from the gross amount of each variety delivered we then ascertain the gross amount of good fruit that we ship to market. Taking the price per pound, we settle with the grower individually, pound for pound, for the fruit he has delivered to the packing-house; thereby the grower receives the full price for the entire season, from the beginning to the close.

That is our plan of operation, and it has been our object and purpose, if this organization should succeed, to widen the field and embrace the other fruit industries of Southern California under one head, and in addition to that to establish in the Eastern cities branch houses, or agencies, employing men of experience, who shall transact the business there for us, men whose interests are identical with ours, and thereby perpetuate the system and carry on the marketing of the respective products of Southern California, particularly those embraced in the fruit industries, under one head.

I will not take your time to outline this more carefully, but we realize this, gentlemen, in Southern California, that we have reached a condition of affairs in which it is absolutely essential that this matter be taken up now by the growers themselves and in their own direct interests. We have various projects on foot in Southern California, and we have also in the State of California.

Now, immigration bureaus are all right, midwinter fairs are all right, exhibits of citrus fruits are all right, but if the present conditions are to continue, gentlemen, and the present methods are to continue, in the marketing of the products of California, of what use is it to invite the people here by our exhibitions? The facts are that the orange growers of Southern California, a very large percentage of them, have not, for the past year, paid their running expenses and the interest on the investment. We need not expect to long continue to hide these facts under a bushel, and the orange growers, as far as I know, in Southern California, have reached this conclusion and determination, and these methods must and shall be corrected in the interest of the product, or the industry must go down. We have, all through Southern California, a large percentage of the crop, as I have said, not paying the running expenses of the ranch and the interest on the investment. We have worse conditions than that, and I understand that the other fruit industries of California are in no better condition. For instance, we have cases in which gentlemen have shipped from ten to fifteen carloads of fruit and have not received a nickel; and you are aware of the condition of the market for deciduous fruit in Southern California. The fresh fruits, particularly white peaches, are put upon the market in Eastern cities and sold at 65 cents a box, under forced sale at auction in the forenoon, and in the afternoon of the same day, the same fruit put upon the market brought \$1 05 per box. We know a gentleman who visited the Eastern market during the busy season, and saw as fine cherries as had ever been grown passed out of the establishment at \$1 25 a box in the afternoon, which in the forenoon of the same day had sold at 40 cents a box at auction. We have no reason to complain of the prices paid by the consumers at the other end of the line. We are satisfied with that, but the leakage between the producer and consumer must be stopped. In order to do this, it is unnecessary to make war upon the gentlemen who have been handling the products in times past. We propose to correct the methods, which are all wrong, and I need but call attention to one feature. These agents come through Southern California early in the season and secure the crop upon a commission basis—so much per box for packing and so much commission for handling in the market. They secure various amounts—some 1,000 carloads, some 800, 400, 300—and the very minute they secure hold on the fruit, they become competitors in the market, in close competition with the growers themselves,

from the same localities, and in precisely the same grade and quality of fruit. The fruit of one grower is then used to undermine his neighbor. Their system is such that they are under the pressure of the growers who are behind them, and with whom they are under contract to market their crops. They are under pressure of finding a market for the very fruit they represent. They are forced to resort to all manner of means and methods, in order to relieve themselves of that for which they are under contract.

Now, in the organization of orange growers we have met with at least a measurable degree of success. We have organizations of this character in all the orange-growing sections of Southern California. They are now in active operation. We are just now completing the details for marketing the fruit at the other end of the line and the matters of detail in handling the crop at this end of the line, and we are hoping, to say the least, for an improved condition of things. [Applause.]

DISCUSSION ON MARKETING FRUIT.

MR. ADAMS: Mr. President, I came here with the hope that some action might be taken on this question of marketing fruit, and I move, Mr. President, that the question of coöperation in the marketing of fruit be referred to a special committee of seven, with instructions to report to this convention at some time on Thursday, in order that the convention may express its deliberate conviction on the general subject.

MR. BRAINARD, of San José: Mr. Chairman, one remark by Mr. Chamblin was exactly in the line of investigation which I have been making, and the point was that we feel perfectly satisfied with what the consumers are paying. I will state, that after making some investigation, for instance, taking the question of prunes—I am a Santa Clara County man, and am interested in prunes—let us say prunes were worth in California 10 cents a pound; this year prunes in California are worth 5 cents a pound. In the East the consumer is paying practically the same to-day as he did last year. So, there is something wrong about that. I have investigated, and I find that in the most of cases that is true—he is paying the same price to-day for prunes that he paid last year. There ought to be 5 cents difference. Now, 5 cents difference in the price of prunes will quadruple the consumption. There will be four times the amount consumed if you can only reduce the price 5 cents a pound. The question I wish to put out upon this convention is, Can there not be some way by which these organizations in California can reach out into that country and control, to a certain extent, the retail price of your products? There is where it finally goes. You may talk about all the generalities and the ways in which it gets there; it has got to go through the wholesale grocers, or through the retail man, but it is the consumer who finally takes it, and it will go no faster than the consumer will buy; that is, eventually. So, if you can attend to that last item, if you can make that a little larger, you have gained a point, and all these other generalities will follow it. Now, if there can be an organization that will reach so far, through these meetings, to control other matters, it will be very easy to stretch that a little further and to a certain extent control the retail prices, which, I believe, have greater effect than we give them credit for.

THE CHAIRMAN: I would suggest that one of the most important things that the State organization can do is a thing that costs money, but it is simple to overcome, in my judgment. It is the least of the three things we have to do. The first thing to do is to thoroughly establish yourself among the people who are to support it, so that when you go somewhere you know that you are representing something. The next thing to do is to establish yourself among the present channels of the trade in such a way that you perfectly understand all their wants, and the third and last step is to reach out from the accustomed channels and start the new things going, which we all seem desirous of doing, but do not see yet how to undertake it, because money is required.

C. C. THOMPSON, of Pasadena: In coöperation let the fruit growers stand hand in hand. I have in my pocket an account of sales, which I got to-day, of fruit delivered four months ago. I have asked for an account of sales twice, and I was very much surprised when I got them to find that I was in debt for the car of fruit. I expected some very handsome returns, because nothing had been said about it; but I was surprised four months after the delivery of that fruit to get a bill of expenses amounting to about \$70 on the car of fruit. Now then, why should not I give a car of fruit at the start and pay in that \$70 to get the association started? It costs us that anyway, and we are kicking about expenses. Now, I am in sympathy with the State organization, with the State exchange. I am in favor of anything and all things that will give us more unity of action, one with another. The time will come when we will get it, and I do not care how quick it comes.

MR. CHAMBLIN: I would like to say a word further in relation to this matter, and that is this: California is to be the great fruit-producing State of this Union. I will refer now particularly to Southern California, gentlemen, and you may apply this to other portions of the State, as far as it may be practicable. I undertake to say that Southern California is built upon the citrus industry. I undertake to say that the citrus industry and the citrus products have developed Southern California so far as it has been developed, and have developed Southern California to a point that it could never have reached but for the citrus industry. I undertake to state, gentlemen, that the citrus industry is the basis of all values in Southern California to-day. I undertake to say that the citrus industry is the basis of the value of brick blocks, and of bank stocks, and of real estate enterprises, and of irrigation schemes, and of everything of whatever nature and character that tends to the development of Southern California. It is all based upon the citrus industry, and we are all suffering from a condition of affairs, gentlemen, that bodes disaster to the industry. The gentleman before me has referred to the fact that bills of expense have been presented to the grower. I want to say to you that it is no uncommon thing for the growers of Southern California for the past two or three years to have bills of expense presented in addition to the credit which they have furnished after years of hard toil, and I want to inquire of any level-headed business man in Southern California, how long can that condition of affairs and the present basis of values be maintained? I want to say, gentlemen—and I wish that I could reach the ears of every Board of Trade and every business and professional man in the State of California, and I say this after mature deliberation and after a thorough canvass of every orange-growing section of the State of California,

and after having handled fruit, and having had growers come to me and recite their experience and their distress in marketing their orange crop—many of their ranches do not pay the interest and running expenses of the ranch. If these conditions are to continue, how long will it be before the orange growers of Southern California shall go down under the Sheriff's hammer? Unless we combine, gentlemen, what is to become of values; what is to become of these great irrigation schemes now partially completed in these mountain ranges, upon which all this territory lying beneath them is dependent for future development?

I want to say again that unless the method of marketing the orange crop of Southern California be corrected, the values in Southern California will have to be cut in two. Therefore, I maintain this, that while it is all right that we combine our energies to the final development of Southern California, while the matter of midwinter fairs, Chambers of Commerce, Boards of Trade, and Bureaus of Immigration are all right, I want to say to you that it behooves every business man, and every mechanic as well as every business man, and every owner of an orange grove, to bend his best thoughts and best energies and attention to the solution of this problem of marketing the fruit products of California. That is the question that now demands a solution, and, in my judgment, gentlemen, the first of all problems that ought to be grappled with and solved promptly. Now, I am glad the gentleman has made the motion he has. Let there be a committee appointed to take this matter under consideration with a view to carrying this movement along, and I think they will act upon lines which will not conflict with the movement among the orange growers of Southern California, for it is contemplated that the field should be broadened, and we shall take under the wing of protection of this organization all the fruit industries of California. Why, gentlemen, the proposition that further confronts us is this: 7,000 carloads of citrus fruits in Southern California to-day—shall it stop there, or shall it grow to 10,000 or 15,000?

The question was put on Mr. Adams' motion, and it was unanimously adopted, and the Chair appointed as the committee the following gentlemen: I. H. Thomas, R. C. Kells, E. F. Adams, T. H. B. Chamblin, H. A. Brainard, Edward Berwick, N. W. Blanchard, and D. T. Fowler.

Recess was then taken until to-morrow at 9:30 A. M.

. XXII.

TRANSACTIONS OF THE SECOND DAY.

LOS ANGELES, November 22, 1893.

Meeting called to order at 9:45 A. M. by President COOPER.

RESOLUTION OF RESPECT.

MR. GRIFFIN: Mr. Chairman, the Committee on Resolutions has prepared an appropriate resolution on the death of Hon. J. M. Rusk, which I would ask the Secretary to read.

The Secretary then read the following resolution:

WHEREAS, The sad news of the death of the late Secretary of Agriculture, J. M. Rusk, has come to us; and whereas, Secretary Rusk proved his friendship to the fruit interests of California, and assisted us in many ways; therefore, be it

Resolved, That we, the fruit growers of California, in convention assembled at Los Angeles, this, the 22d day of November, 1893, tender to the bereaved family of our late and lamented Secretary, our sympathy and condolence in their great bereavement.

The resolution was unanimously adopted, by a rising vote.

CURING * THE WHITE ADRIATIC FIG.

By GEORGE A. RAYMOND, of Miramonte.

In what I am about to say on the curing of the fig, please bear steadily in mind, first, that I speak of the White Adriatic only; and second, of that fig as grown by me in my own orchard and locality. Of other varieties, other localities, and other methods I have but little knowledge and no practical experience. So I condemn none of these things, claiming no superiority in any respect.

The proper curing of the fig begins with the picking. No one with large, clumsy hands and thick, blunt fingers can pick as it should be done. The stem must be taken, but the skin must not be bruised nor the fruit split. Pick when the fig is fully ripe, but do not use figs that have dropped off the tree to the ground. I differ here from other growers, but I find that a sound fig will not drop, but will dry on the tree, and I also find that the figs that drop are always defective. Do not forget that I am talking only of my figs. Pick in small wire baskets that hang on the left arm, leaving both hands free. Empty these into shallow boxes or baskets. Do not use deep ones, as the fruit is so tender that the lower portion in a deep vessel becomes bruised and worthless for curing. Place the figs carefully on the trays, none touching, all lying in the same direction. Sort into two sizes and keep on separate trays. Use enough sulphur to burn fifteen or twenty minutes, and leave in the sulphur-box an hour. Place the trays on racks in the sun. When one side is bleached, turn each fig over by hand to bleach the other. The

racks for trays should hold them at a convenient height from the ground for the frequent handling they now require. It is palpable that picking can be done only in the forenoon, as the entire afternoon is required for bleaching. In from two to three days begin to roll the figs. This will require extreme care to avoid bursting the skin, as it is still quite tender. In laying down each fig, lightly press it a little flat. The following day they can be rolled much more vigorously, and from now on will stand rough handling. In putting down the figs after the second rolling, press them quite flat. They will then cure more quickly. In another day or two they should be well cured but not dried. Never let them get dry and leathery, as they cannot be restored to softness. Stack the trays for another day or so, and then empty into the sweat-boxes.

At every handling, beginning with the picking, a process of sorting and rejection goes on—the sorting for degree of curing, and rejection of bad and defective figs. The defects are mainly black mold and white, and souring. How to detect these it is impossible to describe—partly by their appearance, but principally by the feeling. Often the bad figs are the largest and handsomest, but they never feel just as a perfect one does. The only rule I can prescribe is, until you have learned the trick, to break open and examine any fig that is in the least suspicious. In this way you will soon learn to detect the bad ones, and it will thereafter become almost instinctive and mechanical. This is a most important matter, as one bad fig will spoil a box. Keep in the sweat-boxes a few days, turning them over every day. Now dip in wire baskets in boiling water with a little rock salt added—about one pound of salt to twenty gallons of water. Dip in and out quickly and with a swash three or four times. This serves to wash off the dust that has settled while the fruit is on the trays. Let the surplus water drain off, and then spread out two or three inches deep on trays or a table, and at once cover carefully with light house lining. This keeps off the flies and other insects, and still allows a circulation of air. If dipped in the forenoon they will be in condition to pack next morning.

I have now fairly covered the entire process, but feel that I have failed to convey an adequate idea of the extreme watchfulness, care, patience, labor, and neatness requisite to make it an undoubted success. Not once, except in pouring daily from one sweat-box to another, can they be handled in bulk. Each fig stands on its own merits, and must be treated accordingly—never slighted. I imagine that figs call for infinitely more labor than any other cured fruit, and the detail is great. Let no one go into this business unless he can and will follow it out thoroughly. Moreover, ascertain first whether your locality is adapted to the fig; for if not you will be greatly disappointed. The trees may grow well and bear heavily, but if the climatic conditions are not right the crop will be useless for curing. However, that is a matter outside of an essay on curing. As to packing, do it to suit your own fancy, only do it well and in attractive form. Something original and novel, if neat and pretty or handsome, will prove of great importance in selling the goods. Do not imitate anything or any person, foreign or domestic, as thus you can never establish your brand and hold your market. If, however, you have something distinctively your own, and the quality of the fruit is good, your hold will become stronger and stronger, and you will be pretty safe against even your imitators.

My object in that last clause is that I have had a great many

inquiries as to my style of packing. The only thing about my style of packing is, that it is my style of packing, and it may be no better than somebody's else style of packing. Of course, you do not want to go on the market as an imitator, and if anybody imitates me they have to go on the market as an imitator. I have not monopolized the market in packing. There are a thousand ways that can be employed. Everybody who wants to go into the packing business wants to get up something that is peculiarly his own. [Applause.]

DISCUSSION ON FIG CURING.

MR. BERWICK: I would like to ask as to the cost of the treatment he suggests in drying and handling figs.

MR. RAYMOND: I assume that my figs net me green, as they hang on the trees, about 5 cents a pound.

MR. BERWICK: How much do you get in market?

MR. RAYMOND: I often get 20 cents a pound for figs, and expect that this year.

MR. BERWICK: Do you sell to the Eastern jobbing trade?

MR. RAYMOND: Most of them I sell myself in Oregon, Washington, and California.

MR. BERWICK: Do you sell to the jobber?

MR. RAYMOND: No, sir; I sell direct to the retail grocers. I aim, as a rule, to select the largest retail grocer in the city, and I manage to get to him in some way, generally through a mutual friend. I quote them my price and give them long time. If they want the goods they can have them. I guarantee every box and every fig, and they are at liberty to exchange the box and get a new one if they find any poor ones. In the process of sorting and packing the figs they pass from one hand to another. Some of them are apparently good, but you will find among them some bad figs. The cause of fermentation is generally due to the moisture in the ground or in the atmosphere. I have a neighbor within five miles of me who has trees from the same nursery. He has exactly the same trees. They grow as thriftily as mine. They are handsomer than mine are, if anything. They are larger, but every fig sours on the tree before he can pick it. It was a question for a long time as to what the cause was, and finally I made up my mind that the trouble with him was, he had a large alfalfa field alongside of his orchard. Of course, plants will exhale their moisture, and evaporation goes on through the leaves, and while I had not a particle of dew on my orchard until the latter part of September, his dews commenced about the first of August. The moisture from that alfalfa patch would fall in the shape of dew.

OLIVE CULTURE.

MR. HOWLAND, of Pomona: Mr. Chairman, while there seems to be nothing before the meeting now, I would like the privilege of asking Mr. Lelong a question. It has been stated in the Los Angeles papers and in some of the smaller town papers, that Mr. Lelong was the author of an

article in the "California Fruit Grower," decrying the planting of olive trees unless a man had an immense fortune; and as that statement has been seen by a great many people, I would like Mr. Lelong to answer that question.

MR. LELONG: Mr. Chairman, I asked Mr. Howland to ask the question, because there were two small clippings sent to me, one from the Los Angeles "Times" and one from the Riverside "Press," regarding a statement that has been attributed to me, that I have discouraged the planting of the olive. I have *never* written any article and I have never made any such statement. A year ago I was elected President of the State Horticultural Society, and in my address I spoke of the future of the olive and was afterwards requested to write a paper on the future of the olive in California. I addressed letters to a great many growers, and instead of giving my own views on the question, simply brought the replies I received from the growers into the meeting and had them read. Some said, for instance, that there was no money in growing olives, and gave the reason for it. Others said that there was a great future for the olive, and the letters ran in that way. When the clipping referred to reached me in San Francisco, I sent one of my clerks to find out what article this was that appeared in the "California Fruit Grower," and they sent me the article. The editor of that paper asked me one day about pickling olives. I told him I did not care to buy any more olives unless they were irrigated, and that I wanted them irrigated five, seven, or even as many as nine times; that I would pay \$60 to \$80 for the fruit and wanted it picked by hand; that I would allow no fruit to be knocked off the trees, and that I wanted them for pickles and to be of the Mission variety. This did in no way refer to olives for oil. Soon after that I read an article in one of the Los Angeles papers, by Mr. John Calkins, of Pomona, in which the statements made by the growers in those letters were disputed. In another paper before the Society I called attention to this fact, and when printed sent Mr. Calkins a copy. Lately other clippings were sent to me from the Los Angeles "Times," the Pomona "Times," and the Riverside "Press." In these Mr. Calkins is mentioned as the author, in which it is said that I am the author of an article in the "California Fruit Grower," saying that there was no future for the olive. I have not written any such article. The article referred to is the following:

Much talk is indulged in by certain tree growers and many newspapers in this State to the effect that the olive will thrive and bear well almost anywhere, and especially is it often alleged that the tree may be planted on poor land, and that it will thrive without cultivation or irrigation. The "California Fruit Grower" has opposed these theories—they are for the most part only theories—and has cautioned tree planters against expecting any substantial returns from olive or other orchards so planted and tended.

We do not think any olive grower in California can show satisfactory profits from an orchard under such conditions; nor do we think any experienced olive grower would recommend such a course to a beginner.

Perhaps no other man in the State has experimented longer, more diligently, or with better results as regards the olive for pickles, than Secretary Lelong, of the State Board of Horticulture. He has made an entire success with pickling the ripe olive, and also with the production of the fruit for that purpose.

Mr. Lelong would not think for a moment of attempting to grow olives for pickles on dry land, or on rocky hillsides and thin soils. For pickles, a large sized berry is not only best, but very much the best, and a large berry can be produced only by giving the tree the best of care, including plenty of water. The best results ever obtained by Mr. Lelong were, he says, mainly due to seven irrigations in one season, commencing in July. One thorough irrigation in August, one in September, two in October, and two in November completed the seven irrigations, and the resulting fruit was large and fine, making an excellent article of pickle, and commanding a good price.

Mr. Lelong thinks the Mission the best pickling variety with which he has yet had

experience, though he has tried many others. The Mission olive is less liable to become soft and "mushy," and in many respects is the most satisfactory variety for the purpose. [California Fruit Grower, September 23, 1893.

I have just received the following clipping, also from the "California Fruit Grower," of the 18th inst., which I will read:

Very Wide of the Truth.—The Los Angeles "Times" of last week contains a highly erroneous statement regarding Mr. B. M. Lelong, Secretary of the State Board of Horticulture and President of the State Horticultural Society. The "Times" editorial statement regarding Mr. Lelong is made under the heading, "Olive Culture," and is as follows: "In this connection it may be mentioned that Secretary Lelong, of the State Board of Horticulture, has succeeded in putting his foot in it again, and has aroused much indignation on the part of the olive growers around Pomona, which is the center of the olive industry in this section. That gentleman wrote an article for the 'California Fruit Grower,' in which he advised people not to put out olive trees, as the olive 'was not a profitable thing to raise.' He also stated that the olive should be irrigated at least seven times every year, and said nobody but people of means should have an olive orchard."

In reference to the above we merely have to say that the statement is false. Mr. Lelong never wrote an article for the "California Fruit Grower" taking the ground or making the statements alleged above. The article referred to in which it is alleged that Mr. Lelong made the above statements, appeared in our issue of September 23d. That article was written by the editor of this paper, perhaps a month after having had a conversation with Mr. Lelong regarding olive pickles. In order that there may be no misapprehension on this subject, we give below the part of said article [same as that first read] in which reference is made to the experience of Mr. Lelong. It will be seen by any one who chooses to read, that the assertions of the "Times" editor are not borne out by the facts.

If you will read my reports you will find I have always advocated the planting of the olive, but in doing so I have also advised that those who want to experiment with new varieties should not do it on a large scale unless they had plenty of means; that men of limited means should not plant their orchards to new varieties until their worth is fully proven, which requires many years of continual expense, but should profit by the experience of larger growers. It will be seen by any one who chooses to read that the statements made by Mr. Calkins and the Los Angeles "Times" are not borne out by the facts. The articles which I have just read from the "California Fruit Grower" give my experience in this matter, and I will stand by those statements. I have made no others.

MR. BERWICK: Mr. Chairman, while Mr. Lelong is on the stand I beg to ask him a question concerning the last year's convention at San José. We resolved in San José last year that we wanted the Nicaragua Canal built by the Government, and we directed Secretary Lelong to communicate our resolutions to our Senators and members of Congress. I would like to ask whether that was done, and with what result?

MR. LELONG: It is always the custom, immediately after the adjournment of the convention, that all the resolutions be taken up and at once forwarded to the persons to whom they are addressed. They are certified to under the seal of the Board and immediately mailed. This was done with the resolutions referred to, as well as all others. The memorials adopted in San José were sent to the different members of Congress and to the Senate. When a resolution or a memorial goes into the hands of a Representative he presents that resolution or memorial. These memorials were taken up in both houses.

MR. BERWICK: Mr. President, may I suggest that we instruct our Secretary to keep it up?

On motion, the convention adjourned to meet at 7:30 o'clock this evening.

XXIII.

EVENING SESSION.

Called to order at 7:45 P. M. by Vice-President GRIFFITH.

THE PERKINS PROCESS.

The Chairman announced that a report would be read on the Perkins process.

The following is the report of Messrs. Gray and Bissell :

The two sides of this proposition are Theory and Practice:

Theoretically, it would appear from the foregoing report of Professors Hilgard and Smith that there is no reasonable doubt as to the correctness of Rev. A. T. Perkins' invention, in its relation to the preserving of fruit by an even low temperature and constant circulation of dry air.

Practically, obstacles may appear in its proposed application, which can only be removed by a series of thorough experiments. The theory, however, is of sufficient importance to be worthy of demonstration to determine its practicability.

R. GRAY,
General Traffic Manager S. P. Co.
W. A. BISSELL,
General Traffic Manager A. & P. Co.

MR. ADAMS: Mr. President, I do not suppose this convention has anything to do with that resolution, or that there is anything further it can do. I think that what the Horticultural Society has secured has been that kind of assurance in the premises which would warrant the patentee in going on with a reasonable assurance that he will receive the coöperation of the railroad in the practical tests which must be made, and that the result will be awaited with interest by all fruit growers. It is evident to all of us, I should imagine, that a cylinder of compressed air can be carried with less expense in a car than a room full of ice, and that the cylinder weighs less than the car to carry the ice, and it would not appear that there would be any practical difficulties arise which could not be overcome. If it succeeds, it means a lot of money to the fruit growers, and we wish godspeed to the inventor and to those associated with him in his experiments.

THE CHAIRMAN: As Mr. Perkins is here, we might hear from him on the subject. It certainly is a subject which interests all as growers, and if there can be any light thrown upon the subject it will result in great good to us all.

MR. PERKINS: Mr. President, perhaps anything I might say before this convention would be only reiterating what I have said at the meeting of the State Horticultural Society and fruit growers at San José. And yet, right in this connection, I wish to say that I believe we all, acting as impartial judges, feel that serious charges have been made against the railroad company and we are losing track of this: that while they are endeavoring, as far as possible, to gain money for themselves, they are in a measure helping the fruit growers. While I am not attempting to champion the railroad, still I wish to place a few figures before this convention, because I think, perhaps, it may open the eyes of some of us. Let us then take the rate from Sacramento to Chicago—\$300 per car; adding the refrigerating charge of \$125, or \$425 for the car, for carrying ten or, as they claim, twelve tons of fruit. I believe the charges

are \$440 from San José and \$450 from Fresno. Taking, then, the minimum rate of \$425, and what do we find as the result to the railroad company? \$125 goes to the refrigerating company—it cuts no figure as far as the railroad company is concerned. Here is simply, then, \$300 charges, and of that amount 15 per cent goes to the railroads east of the Missouri River. There is a charge of \$10 per car for crossing the bridge at Omaha, and that leaves for the Southern Pacific, for hauling the fruit over the mountains, simply 45 per cent of 85 per cent, less \$10. Now, in the refrigerator cars this means that the railroad company is required to haul that ten tons of fruit, nominally twenty tons of dead weight in ice; and the return of the car, leaving out the ice, is from 14 to 15 tons—calling that only ten tons, makes four parts of the charge—therefore, your fruit has to pay four times as much for the haul as it would if you used an ordinary fruit car, for which the Southern Pacific receives simply \$2 29 per ton from Sacramento to Ogden. And I ask you gentlemen here if you suppose it is possible for the railroad company to carry products for any less price than that, in such a car as they are compelled to use. But if they receive four times that amount, which is \$9 16 per ton, bear in mind that if they are to carry dead weight, whether it be fruit, or pig iron, or anything else, it means an expense of so much per mile. Now, it does seem as though in the attempt to solve the problem, that it would have the hearty and earnest coöperation not only of the fruit growers, but of the transportation companies. This question does meet with a great deal of interest from one side, and that is the transportation company, because in the process which we are attempting to bring out, whether it is a success or not, it is just as much in your interest as it is in the interest of the transportation company, for we will not exceed two tons of dead weight that will have to be carried.

An ordinary fruit car is 28,000 pounds, or 14 tons. Our car will weigh probably 30,000 to 32,000 pounds, not to exceed that. The average refrigerator car runs from 45,000 to over 50,000 pounds, and the ice added. You can very readily see, then, that if the railroad company is contented to carry your fruit at the present price, or at the rate of \$2 29 per ton, that if it does not have the dead weight to haul, at least it will give you a portion of that which it has been receiving, if you demand it. Therefore, it is a saving to you, and at once you can afford to allow the railroad companies to receive a greater price for their service.

In connection with that, the average price for icing a car, taking the season through, is from \$90 to \$100. Of course, early in the season, when ice is plenty, the charges are not so high, and wherever ice may be gathered at a small price, the charge for icing is small, merely nominal. But there is a certain portion of the season in which it is necessary to pay from \$10 to \$12, and sometimes \$15 a ton for ice, bringing up the rate, taking the whole season through. This process, if it be successful, will save all that.

Now, the rate per ton to Chicago averages, taking the season through, \$40. It is possible that the railroad company could make more money than they are now making in the refrigerator service (and I am not talking against the refrigerator service, because there will be enough for them to do, and enough for any other service also). I believe it to be possible, and it is important for you to work earnestly for that time when you can save \$20 per ton on every car of fruit you send East;

that is, your fruit will cost you, for the hauling and for the process, not to exceed one cent per pound.

I think you can see very readily, if you are willing, that with all the varied means that you have to reduce the cost of production, of packing, of grading, of processing, and of putting on the Chicago market, so that it can be sold for 5 or 6 cents per pound, you can then raise just as much fruit as you choose and you will find a market for it. Gentlemen, this is what we are trying to do, and we hope to have your hearty support. Of course, if I entered into the subject of how we are going to carry this out, it would require a considerable time for explanation. In the last report which has been offered it has been said that the whole thing is experimental. To be sure it is, but we have tried this process carefully for the last three years. I have been at work upon it between six and seven years, and the result is that I was able to show before the convention in San José—and I am sorry I have not them here now—grapes that were put in the process in the year 1891, cherries that were put in the process in the same year, in which decay was absolutely arrested by the process. It is only the carrying out of a natural law. We propose to use compressed air, but if we find that there are obstacles in the way which we cannot overcome, we still have two or three methods to try, and I think that one of the three will solve the problem.

THE CHAIRMAN: Professor Hilgard is here. We would like to hear from the gentleman who made a report on the subject.

PROFESSOR HILGARD: Mr. Chairman, the speaker before me has dwelt upon the diminution of cost. I think we all can easily understand how this diminution is to affect the consumer. I take another standpoint, which from the experience I have had I have no reason to doubt will be justified, and that is this: At the present time we depend upon the speed of the cars to a very great extent; the railroad is compelled to run fast trains for the fruit. According to all the testimony we have in regard to the Perkins process, it appears that the fruit would appear upon the market in the East in so much better condition that it would not be required to be sold in the haste in which it is at the present time, and the railroad would not be required to run the cars as fast as it does now, at heavy expense. Fast trains cost more than slow trains. If the fruit can, as we have reason to believe, be put upon the market in Chicago in a condition in which it will last a great deal longer, if the fruit should not be salable at the moment, we will be able to wait for the market to a certain extent. If any of you have ever been present at the opening of a refrigerator car, in the East, when it arrived from California, you would see that when the weather was at all damp, the fruit was covered with a dew of water in the course of a few hours, and after the spot of moisture appears it soon causes a spot of brown to appear on the grape. This would be obviated by carrying the fruit at a temperature so nearly the one in which it is to be marketed that it would remain dry. That I conceive to be one of the great advantages. I think, as regards any action by this convention, that a strong expression of the desirability of attaining these objects—the diminution of cost, the better preservation of fruit—a strong expression that this is an object so desirable to be obtained, that the railroad and others pushing the enterprise be strongly urged to bring this matter successfully to a definite conclusion, would encourage the railroad to lend its aid in this direction. I have reason to believe so, from the personal interviews I have had with the railroad

authorities, and I think that an expression on the part of this convention would be useful.

MR. MASLIN: I move that this convention heartily sympathize with Dr. Perkins in his efforts, and that a statement be made to the railroad company of the condition of his work, and we respectfully urge the railroad company to facilitate the matter.

Motion adopted.

MR. ALFRED HOLMAN, of San Francisco, then read the following report of the Committee on Markets and Transportation:

MARKETS AND TRANSPORTATION.

GENTLEMEN: Your committee appointed at San José on October 27, 1893, to investigate:

1. On the prospects of finding a market in the cities and sections not yet reached by growers and associations;
2. On the prospect of securing quicker time for fruit shipments; and,
3. To report on cost of picking, packing, handling, and transporting fresh deciduous fruit in carload lots, with the view of ascertaining the proportion received by growers from gross sales of shipments to the Eastern markets—beg leave to report:

First—From information received from the railroad companies and other sources we find that there were shipped, for the fruit season of 1893, up to and including the month of October, from Sacramento, 4,372 cars, consigned to the following points. This statement covers shipments from Sacramento only. The greater number of these cars contained upwards of 24,000 pounds of fruits:

Fresh Fruit Shipments from Sacramento, June to and including October, 1893.

Destination.	No. of Cars.	Destination.	No. of Cars.
Aberdeen, Col.	1	Minneapolis, Minn.	189
Boston, Mass.	187	Mitchell, S. Dak.	1
Buffalo, N. Y.	16	McPherson, Kas.	1
Baltimore, Md.	2	New York City, N. Y.	867
Burlington, Ia.	6	New Orleans, La.	69
Butte, Mont.	52	Omaha, Neb.	171
Chicago, Ill.	1,955	Philadelphia, Pa.	34
Cleveland, O.	46	Phillipsburg, Mont.	—
Cheyenne, Wy.	7	Pittsburg, Pa.	18
Cincinnati, O.	4	Peoria, Ill.	3
Davenport, Ia.	5	Pueblo, Col.	9
Denver, Col.	150	San Antonio, Tex.	6
Des Moines, Ia.	1	St. Louis, Mo.	71
Dubuque, Ia.	8	Sioux City, Ia.	28
Grand Island, Neb.	2	Sioux Falls, S. Dak.	62
Helena, Mont.	51	St. Joseph, Mo.	13
Galesburg, Ill.	1	St. Paul, Minn.	109
Houston, Tex.	3	Spencer Port, N. Y.	1
Kansas City, Mo.	100	Spokane, Wash.	9
Kearney, Neb.	3	Spring Valley, Ill.	1
Lincoln, Neb.	49	Toronto, Canada.	1
La Crosse, Wis.	1	Toledo, O.	1
Leadville, Col.	2	Winnipeg, Canada.	8
Louisville, Ky.	8		
Milwaukee, Wis.	20		
Montreal, Canada.	33	Total	4,372

This leaves 29 cities in the United States, with a population in excess of 50,000, to which no fresh deciduous fruit is directly shipped from California. Many of these are in sections in which we can hope for but

little demand for our products, and others derive their supply from the great distributing centers. Enough, however, remain to show that there is still a vast unworked field for the introduction of our fruits. The list above given shows the points reached. As it may be of interest to know where our fresh fruits do not go, the following list of these cities is appended:

Cities and Towns of Over Fifty Thousand Population to which No Shipments of California Fresh Fruits are Made.

Albany, N. Y.	94,923	Lowell, Mass.	77,696
Alleghany, Pa.	105,287	Lynn, Mass.	55,727
Bridgeport, Conn.	48,866	Newark, N. J.	181,830
Cambridge, Mass.	70,028	New Haven, Conn.	81,296
Camden, N. J.	58,313	Paterson, N. J.	78,847
Charleston, S. C.	54,955	Providence, R. I.	132,147
Columbus, O.	88,150	Reading, Pa.	58,661
Dayton, O.	61,220	Rochester, N. Y.	133,896
Evansville, Ind.	50,756	St. Joseph, Mo.	52,324
Fall River, Mass.	74,394	Scranton, Pa.	75,215
Grand Rapids, Mich.	60,278	Trenton, N. J.	57,458
Hartford, Conn.	53,230	Troy, N. Y.	60,956
Indianapolis, Ind.	105,436	Washington, D. C.	230,329
Jersey City, N. J.	163,003	Worcester, Mass.	84,655
Louisville, Ky.	161,129		

The chief distributing centers now reached, and at which regular auction sales of California fruit are held, are Chicago, Minneapolis, St. Paul, Kansas City, Pittsburg, New York, Cleveland, Buffalo, Boston, Philadelphia. There are one or two other points where auctions are held when fruit arrives in quantities. Dividing the United States into six shipping districts, we find that—

The seaboard district, including New York, Boston, Philadelphia, and Baltimore, took	1,370 cars.
District including Ohio, Kentucky, Tennessee, and part of Southern Illinois, took	138 cars.
District including Mississippi, Alabama, Georgia, part of Florida, and New Orleans, took	159 cars.
District west of the Mississippi River, excepting Colorado, took	1,030 cars.
Colorado took	291 cars.
While the district including part of Illinois, with the cities of Chicago and St. Louis, took	2,435 cars.
Total	5,423 cars.

The facts and figures above presented show those sections which we do not reach, or reach only to a very limited extent.

CONCERNING FASTER SERVICE.

In respect to the second point under consideration, the securing of more rapid transportation, your committee would report that in the course of their investigations they interviewed personally or by correspondence the traffic managers or other officials entitled to speak for the Southern Pacific, the Atlantic and Pacific, the Union Pacific, Rio Grande Western, Chicago and Rock Island. The Southern Pacific assured us that the fault was with the Eastern companies, who do not fully realize the importance of the fruit industry or the necessity for quick time in fruit transportation. Mr. Gray stated that his company had promised to give 45 hours to fruit trains to Ogden, and that they had made within half an hour of schedule time. He gave the assurance that his company was fully alive to the importance of the rapid

movement of fruit trains, and would coöperate with any movement which the fruit growers would make to that end. This assurance we consider very important in its relation to the outcome of inquiries made elsewhere and reported below.

Later, Mr. Rowley, a member of our committee, had an interview with Mr. G. W. Luce, General Agent Freight Department of the Union Pacific Railroad, and that gentleman expressed the attitude of his company as follows:

Permit me to state that while we do not desire to endeavor to shift the burden from our line and its connections east of Ogden to that of the Southern Pacific Company, yet I desire to say that the line east of Ogden was more regular, and the trains were handled at a greater rate of speed than west of Ogden, and, in connection, I wish to advise that we made arrangements with the Southern Pacific Company last season to make 45 hours to Ogden, in which case we were to make with our connections (Chicago and Northwestern, or the Chicago, Milwaukee, and St. Paul) 80 hours Ogden to Chicago. We further endeavored to arrange for the past two seasons, to have the Southern Pacific Company make 36 hours Sacramento to Ogden; we, in that case, would be willing to make 75 hours Ogden to Chicago, actual running time Ogden to Chicago to be 72 hours, and three hours for switching in Chicago. Will state, further, that we stand ready to make this arrangement for the next season's business.

Would suggest in connection with the above, if it be possible, you arrange a regular time for departure of these fruit trains from Sacramento, and schedule the same to arrive at Ogden at a certain hour. If this can be done, it will insure much better service through than if the trains are delivered to us at Ogden irregularly.

The Union Pacific have always recognized that fast service is necessary in the handling of deciduous fruits of California, and it has always been our aim to coöperate with our connections to the fullest extent with this end in view, and we will heartily do so in anything they might suggest which would be the means of placing the fruit in the very best time in the markets of the East, which we appreciate is growing each year, and it is our intention to foster the industry, and to assist in placing the fruit at its destination in the best possible condition.

With a view of ascertaining what time could be had by diverting fruit shipments at Ogden via the Rio Grande Western, the Denver and Rio Grande, and the Chicago, Rock Island, and Pacific railways, we made inquiry and were informed by Mr. W. H. Snedaker, Western Representative of the Rio Grande Western, that his road was prepared to give California fruit shipments prompt service in trains of eight to ten cars, from Ogden to Pueblo in 36 to 40 hours. In this connection Mr. Frank McCormick, Western Representative of the Chicago and Rock Island, stated that his road would coöperate with their connections (the roads above named) in giving quick service, naming 42 to 44 hours from Pueblo to Chicago. This would make the time from Ogden to Chicago, by the Pueblo route, 78 to 84 hours.

From these statements it will be seen that if the Southern Pacific Company will coöperate with its Eastern connections in the matter of reducing the time of transporting fresh fruits to Eastern markets, a very material reduction can be made in the time consumed in transit, as compared with the record of the past season. By study of the above propositions it will be seen that they promise 111 hours (by the Union Pacific) or 116 (by the Pueblo route), as against an average of 192 to 216 hours for the fruit shipments of 1893. There are two contingencies—both very important—namely, (1) That the Southern Pacific will shorten its time from 45 to 36 hours between Sacramento and Ogden, and (2) That the Union Pacific and the other roads named live up to the propositions as above quoted.

CONCERNING FREIGHT RATES.

Incidentally, your committee investigated the question of a reduction in freight rates from California to Eastern points, but received no encouragement from railroad companies in this direction. The Southern Pacific claims that it is now moving fruit at the lowest profitable rate, and that the mileage rates from California are now much lower and the service better than those from Florida fruit districts.

In a communication from Mr. Gray, Traffic Manager of the Southern Pacific, the following statements are made, which are here presented as giving the railroad view of the matter:

The fact is, speed of transit, weight of rolling stock, and other matters taken into consideration, the California fruit service is now done more cheaply and on a smaller margin of remuneration to the carrier than any similar service in the world. I inclose a copy of statement showing the rates on oranges from Florida to Chicago, St. Paul, Cincinnati, St. Louis, and Kansas City; also showing the rate per ton per mile from San José, Cal., to same points, and also to New York City. By this it appears that our rate varies from \$1 12 per ton per mile to Cincinnati—which city we reach by paying an arbitrary local rate—to 87 cents per ton per mile to Boston, while rates from Florida points range:

To Chicago, from \$1 31, the lowest, to \$1 73.
 To St. Paul, from \$1 37, the lowest, to \$1 49.
 To Cincinnati, from \$1 37, the lowest, to \$1 92.
 To St. Louis, from \$1 54, the lowest, to \$2 01.
 To Kansas City, from \$1 70, the lowest, to \$2 61.

When the character of the service is taken into consideration, there is no comparison between our rates and those at the East. I am told it frequently takes longer to get fruit from Florida to Chicago and points in the Northwest than from this coast to same points, notwithstanding the fact that we have to overcome several ranges of mountains.

To correctly understand the situation and the rates charged, it must be remembered that a large portion of the deciduous fruit is now transported in refrigerator cars.

The minimum weight of fruit in these cars is 24,000 pounds, the rate on which to Chicago being \$1 25 per 100 pounds from San José, the cost would be \$300 per carload of 24,000 pounds. For the service west of Ogden the amount received by the Southern Pacific Company is \$140 78.

The weight of an ordinary fruit car is.....	24,000 pounds.
Excessive weight of refrigerator car.....	16,000 pounds.
Excessive weight of refrigerator, return.....	16,000 pounds.
Weight of ice East bound.....	8,000 pounds.
Weight of fruit.....	24,000 pounds.

Total weight.....64,000 pounds.

Dividing this total weight (64,000 pounds) by the revenue west of Ogden \$140 78, gives 22 cents per 100 pounds, or an average for 870 miles between San José and Ogden of, in round figures, one half a cent per ton per mile.

From a railroad standpoint the only apparent hope for lower freight rates lies in the replacement of the present cumbrous system of refrigeration with some appliance equally effective and of less weight.

CHARGES FOR PACKING, CARRYING, ETC.

In regard to the third matter under investigation, your committee addressed a number of letters to prominent fruit growers and shippers, asking for information that would form a basis for estimating the cost of picking, wrapping, boxing, hauling, and placing on board the car, and transporting to the East the various kinds of fruit. To these letters several replies have been received, and to their authors your committee is indebted for the following facts and figures. We find that the several charges above enumerated average for each package as follows:

Peaches, boxes.....	\$0 64
Pears, boxes.....	1 23½
Cherries, boxes.....	49
Apricots, boxes.....	66
Apricots, crates.....	70
Plums, crates.....	70

If your fruit sells for an amount in excess of these figures, such excess represents your profit, less commission paid on such excess. These figures are based on shipments in refrigerator cars, and represent the average cost of all expenses incidental to fruit shipments from orchard to Eastern purchasers, cost of cultivation, and value of fruit—nothing taken into consideration.

SUGGESTIONS IN CONCLUSION.

Referring again to the first object of our inquiry, namely, the question of putting California fruits into markets not now reached, there is small satisfaction in the statistics which we have presented: That in the vast region comprising the populous States of Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, New York, Connecticut, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, and North Carolina we sell on an average yearly 1,370 carloads of fresh fruit; that in another great region comprising Ohio, Indiana, Kentucky, Tennessee, and the southern third of Illinois we sell only 138 carloads; that there is a list of nearly thirty towns in the East, each of fifty thousand inhabitants and upwards, to which California fruits never go direct. These facts are interesting enough, but they have no real value save as they confirm the familiar statement that our products are not fairly put into their natural markets; that the districts in which our fruits are offered to consumers are almost insignificant when compared with the wider districts where fruit is wanted, but to which it never goes. These facts lead up to and point distinctly to one conclusion, namely, that the methods of distribution currently practiced are pitifully inadequate and inefficient.

The present method of marketing our fresh fruits is the dispatch of carload lots to a few central points, where they are sold at auction for local consumption, or, possibly, for reshipment in small lots to contiguous communities. No direct shipments are made to points where the local demand will not justify the sending at one time of a whole carload; and it is for this reason that so many large towns never get a taste of California fruit. Since they cannot take a carload of 24,000 pounds, then we cannot serve them at all. We are told by experts that from a railroad standpoint this is the only practical method of shipment; that to dispatch a single car with two or more distinct consignments for two or more distinct points on direct lines of road is practically out of the question. It would be as presumptuous as it would be rude to question the expert ability of the gentlemen from whom our committee has made inquiry or the sincerity of their replies; but we believe and claim that an utter misconception of the conditions and requirements of the fruit traffic lies at the foundation of their theories. A system of shipment from the places of production to central points, with reshipment from these depots to minor points, will do well enough for miscellaneous imperishable commodities, but in the case of fresh fruits it is totally insufficient. The application of this system to California fresh fruits and the Eastern markets involves practical elimination of all but the large centers from the field of consumption, and so contracts the volume of our sales. How this affects the producer need not be told.

ALFRED HOLMAN,
B. N. ROWLEY,
JOHN ISAAC,
Committee.

SUPPLEMENTAL REPORT.

When our expert friends declare that it is not possible to ship direct to points which cannot take a full carload, they have in mind the conditions and regulations which now prevail on the railroad lines with which we deal. And this brings us to the point that the railroads have taken no steps in the way of providing a suitable equipment for the California fresh-fruit traffic. Apparently they do not realize the magnitude of the trade, nor understand its requirements. To this great special traffic, the very life of which depends upon their coöperation, they give only such rough-and-tumble facilities as belong to a miscellaneous freighting business. Now, if the roads had for the California fresh-fruit traffic special cars built with compartments; if they had a sufficient number of these cars to meet all demands promptly; if they had locomotives in sufficient numbers to haul them promptly and rapidly; if the fruit trains were given the same track rights allowed to express trains—if these suggestions were realities, does any man of sense doubt that some things which the experts declare impracticable would be very simply and easily done? For example, would it not be possible under such conditions to load a six-compartment car at Vacaville or Ontario with six separate lots of fruit for the six cities of Tiffin, Mansfield, Canton, Zanesville, Columbus, and Springfield, all in the State of Ohio, and to make the deliveries in a satisfactory way? Does anybody doubt that it would?

It is our judgment that to reach new markets some such combination of equipment and train service is essential; but it would be Utopian to expect it to come of its own motion. Its natural and essential prerequisite is the creation at this end of the route of a shipping system which will require and exact such service. The great express companies, not the railroads, have made the American expressage system, with its messengers on every train, its depot at every railway station, and its distributing servant in every village. As the necessities of the service grew the railroads, under the pressure of specific demand, provided them; but if they had been left to their own devices, the great expressage system would never have been brought into existence. And so it will be with us. So long as we leave our necessities without organization to plead feebly for themselves, we shall have just the kind of service always given to an unsystematic traffic. When we have created a shipping system ready to operate as the express companies do, then we shall secure facilities for transportation proportionate to the magnitude and value of our fruit interest.

Opinions differ widely as to the right way to create such an organization. We are told by persons who are entirely sincere, that the producer is outside of his natural sphere when he undertakes to be his own marketer; that, like a certain brand of sarsaparilla, fruit selling is a thing peculiar to itself and that it must be left to experts; or, in other words, since fruit production is one thing and fruit marketing another, that the producer should stick to his orchard and leave the distribution of his product to the commission merchant. Now, we agree that fruit marketing is a special trade; that it calls for business training and acquaintance with markets, etc.; but we deny that these qualifications are found with commission men more than among the producers themselves. As a matter of fact, after many years of trial, the commission

system has failed. It does now but what it did in the beginning, namely, it sells our fruits at auction in a few general markets. It has not, like the great oyster companies, like the great express companies, like the Standard Oil Company—not to mention a dozen other equally notable instances—established agencies away from the centers and so widened the field of fruit consumption. The inefficiency of the commission-house system is demonstrated by the fact that after many years of exclusive control of our business, our fruit products are still unknown, or at least not commonly sold, in the larger part of the Eastern market.

And the fact of inefficiency is not less clear than the cause of it. Generally speaking, the commission interest is foreign to us. It has only a commercial relation to us—about the same sort as California merchants have with the people of the Sandwich Islands. It is not possible under such conditions that our work should be well done. And, in our judgment, it will not be well done until the California spirit is in it. It is our profound conviction that the future welfare of the fruit interest of California, as it is dependent upon the Eastern market, rests upon the coöperative support of a State exchange operated in the direct interest of the fruit growers, and having its agencies not only in the great cities but throughout the whole vast region beyond the Rocky Mountains. What Adams & Co. can do, what Wells, Fargo & Co. can do, what the Standard Oil Co. can do, what a firm of Yankee shoemakers can do, surely the great horticultural interest of California can do. We are told that suitable men cannot be found to work for an association; that expert commercial ability can only be developed by the interest of personal ownership. We don't believe it. The express companies and the railroad companies seem to be served by paid agents with ability and devotion, and there is no reason why we cannot find men to do our work in the same spirit. The career of the California Fruit Union proves that the coöperative principle can in fact be successfully applied; and what, let us ask, would be easier than the evolution of such a system as we suggest from such a good foundation as this same Fruit Union affords?

For the suggestions herein embodied we claim no credit for originality. If nobody else had ever thought of them before, we should distrust our own judgment. But we have only set down things long familiar to everybody. As regards the plan of shipment direct to minor points in broken loads in compartment cars, so competent a railroad man as Mr. W. H. Mills long ago suggested and approved it; as to the suggestion for general coöperation, that happily seems in a fair way to be made a reality. The two things together, your committee believe, are the best hope of the California horticultural interest.

ALFRED HOLMAN.
JOHN ISAAC.

MR. ADAMS: Mr. Chairman, I think when gentlemen take the pains that these gentlemen have to secure information for us, that it requires some recognition, and I move that the thanks of the convention be tendered to these gentlemen for their exceedingly important and valuable report; and also that the editors of the "Rural Press" and "California Fruit Grower" be requested to publish the report in full; and also in order that the facts may be put before the people earlier than through the natural publication of the report by the State Board of Horticulture,

that this paper be published as a separate pamphlet by the State Board, so that we can get at these figures and have them understood.

Adopted.

[The report was published in pamphlet form, and a copy was sent to Mr. Smurr, General Freight Agent of the Southern Pacific Company. He at once sent the following communication, which is herewith attached:]

OFFICE GENERAL FREIGHT AGENT (PACIFIC SYSTEM),
SAN FRANCISCO, January 18, 1894. }

To the honorable State Board of Horticulture of California:

GENTLEMEN: In your Bulletin No. 65, subject, "Fruit Markets and Transportation," you publish the following statement from the General Agent of the Freight Department, Union Pacific Railway:

"Permit me to state, that while we do not desire to endeavor to shift the burden from our line and its connections east of Ogden to that of the Southern Pacific Company, yet I desire to say that the line east of Ogden was more regular and the trains were handled at a greater rate of speed than west of Ogden, and, in connection, I wish to advise that we made arrangements with the Southern Pacific Company last season to make 45 hours to Ogden, in which case we were to make with our connections (Chicago and North-western or the Chicago, Milwaukee, and St. Paul) 80 hours Ogden to Chicago."

And your committee to whom this matter was referred, report that:

"From these statements it will be seen that if the Southern Pacific Company will co-operate with its Eastern connections in the matter of reducing time of transporting fresh fruits to Eastern markets, a very material reduction can be made in the time consumed in transit, as compared with the record of the past season."

As this conclusion by your committee appears to be based on the representation that this company has not made as good time west of Ogden as the lines east, we think it, in justice to all concerned, proper to state that the schedule as *agreed on for special trains of fruit in ventilated cars* for the fruit-shipping season of 1893 was—

45 hours from Sacramento to Ogden.
51 hours from Ogden to Council Bluffs.
24 hours from Council Bluffs to Chicago.

120 hours from Sacramento to Chicago.

Under this special schedule, which was the best that could be arranged, the Southern Pacific Company performed its part, the average time of its seventy-five special trains of ventilated fruit cars being 45 hours 20 minutes, which I think all will admit to be very close to the schedule for so long and difficult a run, so close as to cause no appreciable difference in time or handling of the trains.

We received from day to day from the Union Pacific Company a record of the time made on these trains after delivery to them; a few of the trains were omitted, unfortunately, but we have the record as furnished us by the Union Pacific for sixty-nine of these special trains, which shows the average time made, Ogden to Council Bluffs, to have been 62.68 hours. As reported by the Union Pacific, however, seven of these sixty-nine trains made such slow time, that for fear there may have been some inaccuracy in the report concerning them, we omit them; this leaves sixty-two trains, and on them the average time as reported by the Union Pacific was 59.42 hours. As the agreed schedule from Ogden to Council Bluffs was 51 hours, this shows the difference between the time actually made and the schedule agreed on was over 8 hours, which accounts for the embarrassing lateness of arrival at Chicago.

We make this correction merely to relieve ourselves of the misapprehension and prejudice that naturally result from a statement which charges this company with dereliction that is of serious importance to the growers and shippers of fruit.

We regard performance as of more real value to the grower and shipper than a promise of performance; it is easy to make a schedule, but it is not always so easy to run trains in accordance with the schedule. We are believers in making a schedule that can be run by, so as to give a uniform service on which our patrons can rely, rather than endeavor to fix the speed at so high a point that judging by the experience of the past it is not likely the schedule can be maintained with any fair degree of regularity. This is the view also held by the Rio Grande Western, Denver and Rio Grande, Colorado Midland, and Rock Island connections via Ogden, all also engaged in transporting green fruit during the deciduous fruit season, and I understand to be the practical view of our Union Pacific friends as well. A very fast time schedule looks very well on paper, but a more conservative schedule, carefully carried out, produces results of much more value to our patrons, whose interests in this respect we bear constantly in mind and shall be ever mindful of in the future.

Yours truly,

C. F. SMURR,
General Freight Agent.

DISCUSSION.

MR. BERWICK: I received these figures this morning. I did not have them yesterday. Perhaps some of you were here when I gave my paper yesterday. It was touching the government ownership of railroads. They are from a professor of economics. He is quite impartial in the matter. It is regarding the various countries which already own their railroads.

Germany has 26,627 miles of railroad, of which 13,057 are owned by the State and 293 miles are owned by private companies and also operated by the State. Expenses, 805,000,000 marks; receipts, 1,307,000,000 marks. That, you see, leaves a profit to the State of some 500,000,000 marks. The calculations are not made in this table. Regarding the profits of these railroads, I would say that they are almost all operated with a large profit to the State.

Austria-Hungary has 17,196 miles, somewhat more than half of which is owned and operated by the State. Expenses, 151,000,000 florins; receipts, 286,000,000 florins. There, again, is a profit of 135,000,000 florins; almost, I suppose, 90 per cent profit there.

Italy sold her railroads some years ago because hard pressed for money. She has to have a large army, or thinks she has, just now, in order to compete with the other countries surrounding her.

France: Railroads owned by private companies, but will revert to the State, without compensation, about 1950; that is fifty-seven years hence.

Belgium: The State owns 3,241 kilometers of railroads; private companies own 1,276 kilometers. In 1891 the gross receipts for the State amounted to 142,000,000 francs; expenses, 84,000,000 francs. There, again, was a profit of about 58,000,000 francs.

MR. ADAMS: Does that include the interest on the capital?

MR. BERWICK: I presume so. These are not my own figures; they are given to me by a professor of economics of California. These are his statements; they are to be taken for what they are worth. I can, no doubt, get these figures specified for you in a reasonable time.

New South Wales, 2,185 miles. Cost of construction and equipment to June 30, 1892, £33,000,000 sterling; gross earnings for last year, £3,000,000 sterling; working expenses, less than £2,000,000; that leaves £1,000,000, or \$5,000,000, profit to the government.

Street railways the property of the government: New Zealand, 679 miles of government railway in the north island, 1,170 miles in the middle island, and 142 miles of private lines. Expense of construction of all government lines, £15,497,700; operating expenses, £700,000; income, £1,115,481—a profit of about £400,000, or about \$2,000,000. In Queensland there were 2,304 miles of railway at the end of 1891, all owned by the government; cost of construction, £15,943,000; receipts, 1891, £974,705; operating expenses, £640,494; profit, £330,000, or \$1,650,000.

These are the figures I have. I will make no comment on them. You see, gentlemen, that governments can own and operate their railroads without losing money.

REPORT ON CO-OPERATION.

The Secretary then read the report of the committee appointed to consider the question of coöperation in marketing fruit, as follows:

To the Fruit Growers' Convention:

Your committee appointed to consider the question of coöperative fruit marketing have had the subject under consideration and respectfully report as follows:

We are satisfied that the conditions which have already brought disaster upon some branches of the fruit industry of California will, if unchecked, speedily bring similar disaster upon all other branches.

We believe that the only remedy is that the growers shall themselves assume the marketing of their own product, and that the time has now come to apply that remedy.

We heartily approve and indorse the methods of coöperation already adopted by the citrus growers of Southern California, and the dried-fruit producers of Santa Clara County, which we find substantially alike in principle, differing only in detail to meet the different requirements of the dried and fresh-fruit trades.

We regard it of the utmost importance that the great coöperative movement now in progress should be so directed that all interests involved should work together, not only in harmony, but in actual consultation with each other.

To this end we strongly approve the movement originated by the State Horticultural Society for the organization of a State Fruit Exchange, and urge all individual growers and all coöperative societies to unite in its support, trusting to the combined judgment of all interests to direct its movements to the general good.

We especially urge the importance of a large attendance from all parts of the State at the meeting called by the State Horticultural Society for the 29th of December next for the purpose of settling and indorsing the plans for the exchange, awakening enthusiasm in its support, and selecting the men to carry it on for the first year.

I. H. THOMAS, Tulare County, Chairman,
T. H. B. CHAMBLIN, Riverside County,
D. T. FOWLER, Fresno County,
EDWARD BERWICK, Monterey County,
N. W. BLANCHARD, Ventura County,
R. C. KELLS, Sutter County,
H. A. BRAINARD, Santa Clara County,
EDWARD F. ADAMS, Santa Cruz County,
Committee.

Los Angeles, November 22, 1893.

On motion, the report was unanimously adopted.

RESOLUTIONS.

ON NATIONALIZATION OF RAILROADS AND NICARAGUA CANAL.

MR. BERWICK: It is necessary to know first what we want exactly—whether we want to have the railroads nationalized. I think we do want it. That is about the thing we want, and should want the most, just at present in politics. We waste our time and strength over what are comparatively unimportant issues. Here is an issue that comes home to every farmer right to his door, touches his pocket every year. We see other countries operating their railroads, owning them and conducting them successfully, and I think we are not asking too much of our Government to ask it to fall into line also. We adopted the Australian ballot law; we were not ashamed to undertake that. We might try the Australian railroad system with equal or more advantage; but I was hardly prepared to offer to-night any special resolution, though I have one drawn up to submit to the convention. When we are all agreed that we want this government ownership of railroads, we ought to think of some way to bring it about. Now, if we think this is right, gentlemen, I think we might each one of us, if we want this thing, take

a petition home to our neighbors, and get these petitions signed by every man and woman in his neighborhood. I am sure, in my vicinity, I could get every person to sign, and if this nation unanimously called for some action of this kind on the part of the Government, I am sure the Government would respond to the nation's call. So, if you will allow me, I will read the resolution.

Resolved, That this convention of horticulturists of the State of California, assembled at Los Angeles, this 22d day of November, 1893, believe that the best interests of California horticulturists and of the American nation would be subserved by the nationalization of the railways.

Resolved, That it believes that for such action there will never be any time better than the present. It therefore directs the Secretary of the State Board of Horticulture to memorialize Congress and every member thereof individually, and every United States Senator.

Resolved, That this convention considers that the interest of the whole Pacific Coast and of the entire American nation demands the immediate construction, by the United States Government, of the Nicaragua Canal.

Referred to Committee on Resolutions.

ON DEATH OF WM. T. COLEMAN.

On motion of MR. ROWLEY, the Chairman instructed the Committee on Resolutions to prepare suitable resolutions on the death of W. T. Coleman, of San Francisco.

ON THE PERKINS PROCESS.

The following resolution was offered by MR. E. W. MASLIN and referred to the Committee on Resolutions:

Resolved, That we have heard with great interest the system devised by Dr. Perkins, for the transportation of fruit, to secure its delivery without impairment of freshness, flavor, and appearance, and we hereby express our appreciation of the merits of the system, and this convention earnestly requests the several railroad companies to examine the system and to adjust their service cars to facilitate the experiment, believing that the system may prove an efficient means of securing a better market for our fruit.

On motion, duly seconded, the meeting adjourned until 9:30 o'clock to-morrow morning.

XXIV.

TRANSACTIONS OF THE THIRD DAY.

THURSDAY, November 23, 1893.

The meeting was called to order by Vice-President KINNEY.

THE CHAIRMAN: The first thing this morning will be resolutions from the Committee on Resolutions. The Secretary will read.

WHEREAS, It has pleased the Almighty to take from our midst one who has been identified, not only with the fruit growers' interests, but in all matters relating to the welfare of this coast; and whereas, by the death of the Hon. Wm. T. Coleman, California has lost one of its best and most prominent citizens; therefore,

Resolved, That we, the fruit growers of California, in convention assembled, tender our heartfelt sympathy and condolence to the family of the deceased.

Resolved, That a copy of these resolutions be sent to the family of the deceased, and published in the daily papers.

THE CHAIRMAN: The next business before the convention will be a presentation by Mr. Griffith.

PRESENTATION TO THE STATE BOARD OF HORTICULTURE.

MR. GRIFFITH: Mr. Chairman, on behalf of the many fruit growers of Southern California, I take pleasure in presenting to the State Board of Horticulture this framed picture of Professor Koebele. It is but an humble token of our high regard for the untiring work of this Board in our interest. Besides, it is eminently proper to prove that, although absent, modest Mr. Koebele is not forgotten by the horticulturists in this part of the State, who believe him to be, considering his vocation and past efforts, the greatest genius of modern times.

THE CHAIRMAN: I will call on Mr. Lelong, Secretary of the State Board of Horticulture, to answer in response to Mr. Griffith's presentation.

MR. LELONG: Mr. Chairman, Ladies and Gentlemen, it gives me pleasure on behalf of the State Board of Horticulture, to accept the gift of the fruit growers of this part of the State—the framed picture of Albert Koebele. We recall that but four years ago the cottony cushion scale had invaded the orchards of our State, so that it threatened their very existence. At that time, all that could be done to subjugate this pest was done, but no effort that was made could keep it in subjection enough to warrant the pursuit of the citrus industry. Mr. Koebele was sent to Australia to discover, if possible, parasitic insects, and did discover the *Vedalia cardinalis*, which saved the citrus industry. Later on, the fruit growers of this State, appreciating the eminent services which they received through Mr. Koebele, presented to him a gold watch and chain; they also presented to Mrs. Koebele a beautiful set of diamond earrings. The history of that presentation will be found in the report for 1891. Later on, Mr. Koebele was again sent to Australia, where he discovered other beneficial insects, which will, I think, eventually prove of great benefit to California. Some of these are very promising, and only

require more time to establish their reputation as scale destroyers. Mr. Koebele is at present engaged by the Hawaiian Government, and will soon again visit Australia to search for parasitic insects, and he has promised to send to us those that he may there find. Therefore, we will receive from him further aid in that respect. I regret exceedingly that Hon. Ellwood Cooper, the President of the State Board of Horticulture, who would accept this gift on behalf of the State Board, is not present. He is very ill. He was taken ill yesterday, and will, perhaps, not be here until this afternoon. I thank you.

SUGGESTIONS ON HORTICULTURAL QUARANTINE.

By ALEXANDER CRAW, Quarantine Officer.

When the discovery of gold in California was heralded to the world, and the fortune-hunting pioneers were attracted to this coast in the hope of finding a short if not easy road to competence, there were many among them who left with regret the fruits of the old homestead, and some of these packed among their treasures seeds, pits, and plants of the choicest varieties of fruits common in their New England or Southern homes. These found their way to California, some across the plains, more across the isthmus. Preceding them, and the pioneers among the fruits of the Pacific Coast, were those introduced by the Mission Fathers. These all found their way into our State after a long journey by sea and land, and whatever pests they may have been originally infested with had succumbed to the long journey. This formed a natural quarantine against outside pests, and our early orchards were, so far as I have any authentic knowledge, absolutely free from all pests and diseases.

For many years the importation of trees and plants was expensive and hazardous, and but few and small lots were introduced.

The profits of fruit growing in pioneer times were very large, and this, in conjunction with the rapid growth, healthy appearance, and early fruiting of trees, induced several enterprising individuals to engage in the nursery business; healthy home-grown stock was produced to meet the demand, and for many years our fruits and orchards were free from destructive insects and fungous growths. Orchards were not numerous then, and were far apart, so that if a tree, or even an orchard, had been infested there was little danger of its infesting others.

With the advent of the railroad it was discovered that in California fruit growing was very profitable, and that the fruits grown here were superior to those produced elsewhere in the Union, and a natural impetus was given to this industry, which has steadily increased with expanding markets and more rapid, cheaper, and more extended facilities for transportation. A natural desire to obtain the best and the greatest number of varieties, on the part of the grower, led to competition among nurserymen to get what their customers demanded, or what would be acceptable to them. With rapid transportation the shipment of trees and plants from long distances has been made possible, and for years our State has been flooded with trees from every quarter of the globe, which were admitted without question, and with them came numberless pests and diseases which have annoyed our orchardists, entailed endless trouble and expense upon them, and very materially reduced their profits.

The planting of whole sections and whole counties contiguous to each other with orchards has facilitated the spread of these pests, and now makes transit easy from one orchard to another, from one county to another, until but a small portion of the State is free from their depredations, and the best methods of combating them is one of the most serious questions which we have to consider to-day. The destruction wrought by them soon forced itself upon the attention of our fruit growers, and the outgrowth of this was the organization of the State Board of Horticulture, with its Quarantine Officer, County Horticultural Commissioners, and Local Inspectors. The duties of these officers are twofold, preventive and curative, having in view the estoppel of the introduction of new pests, and the destruction of those which have already gained a foothold.

There is an old saying to the effect that "an ounce of prevention is worth a pound of cure," and it has proved so in this case; for, while we have expended enormous sums of money and endless labor in our contest with these tiny enemies, we have succeeded only in preventing their too rapid increase, and hardly that, and are far from exterminating them with all our labors, aided by all known artificial remedies; whereas, our preventive labors have been so effective that I believe but one new pest has found its way into our State since the passage and enforcement of our quarantine laws.

To you who know by hard experience what it means to have your orchards infested by destructive pests; who have seen your years of patient labor and waiting and investment in danger of being destroyed when the harvest should be ready; who have struggled incessantly year after year to get even a portion of your reward, while the rest is devoured by your millions or billions of insect foes that invade root, trunk, limb, branch, twig, leaf, and fruit, I need not enlarge upon the necessity of the strictest quarantine laws. There are yet numerous insect enemies and fungous diseases that we have not got and do not want. The peach yellows, which has devastated such large tracts in the peach regions of the East, reducing to a profitless waste what was once a remunerative country, has never yet obtained a footing in the peach orchards of our State. The plum curculio, which has rendered plum and cherry growing a total failure in many parts of the East, has never yet made his devastating presence known in our prune and plum and cherry orchards, and if he ever does, we may as well go out of that branch of horticulture.

We are now importing fruit, trees, shrubs, plants, and seeds from the East, from Europe, Australia, China, Japan, the South Sea Islands, South and Central America, and nearly all other countries; hardly a vessel arrives in our ports but brings some of these, and most of them are infested with some pest. On them are found scales, the eggs and pupæ of leaf-eating and boring beetles and moths, and various other forms of insect and fungous life, in most cases unaccompanied by the natural enemies which serve to keep them in check in the country of their origin.

It will be readily appreciated here that eternal vigilance is the price of success in the fruit industry, and if we would reap that just reward for which we labor, we must take effective measures to keep out those destructive agencies which we have not yet got, and stamp out by the best means those which we have.

This brings me directly to the question under consideration: "The

best means to secure effective quarantine against the introduction into the State of foreign tree pests and diseases." Under the Act organizing the State Board of Horticulture, it was required to make regulations for the purpose of preventing the spread of contagious diseases among fruit and fruit trees, and for the prevention, treatment, cure, and extirpation of fruit pests and diseases. In furtherance of this object the Board has formulated a set of regulations, the first one of which provides: "All consignees, agents, or other persons shall, within twenty-four hours, notify the Local Inspector or Quarantine Guardian of the arrival of any trees, plants, buds, seeds, pits, or cions at the first point of debarkation in the State of California."

To a violation of this regulation no penalty is attached, and it is therefore ineffective, and the only method of discovering importations of this character lies in the vigilance of the Local Inspectors.

Following the example of California, the Government of the Cape of Good Hope has passed a quarantine law giving the Governor power to provide by proclamation for protection against the importation and spread of pests, and providing a penalty for its contravention in a fine not exceeding £500, or \$2,500, with the alternative of imprisonment at hard labor not to exceed two years. It will be seen from this that the Cape Colony Government is fully alive to the necessity for stringent means to prevent the introduction of the enemies of the orchardist and vineyardist. I do not know whether our Legislature could delegate such powers to the Board of Horticulture, but there should be some measures by which the neglect or refusal on the part of importers or consignees of trees and plants to notify the Local Inspector of the district into which they are imported of their arrival, could be accompanied by a penalty. This would prove a most effective remedy against the surreptitious introduction of infested stock, and greatly lighten the labors of our Local Inspectors.

California was the first to recognize the necessity of protection against the introduction of insect enemies of the orchardist, and this necessity was forced upon us by the vast importance of the fruit industry, overshadowing any other industry in the State. Following our lead, the Cape Colony Government passed the law to which I have referred above, and the Governor, in pursuance of the powers vested in him thereunder, has formulated the following regulations, which bear date of March 8, 1893, and which are here reproduced, showing the stringency of the quarantine regulations of Cape Colony, and as containing some features which it would be well to copy in our own State:

IMPORT REGULATIONS.

I. The importation into this Colony, from places beyond the boundaries thereof, of all grapevines or cuttings, or portions of grapevines, is absolutely prohibited, with the exception of vines and portions thereof imported by the government of this Colony under such precautionary measures as it may decide to be necessary.

II. All trees and plants other than vines, and all tubers, roots, and bulbs, or any other portions thereof, may be introduced into this Colony from places beyond the boundaries thereof, provided each such consignment of trees, plants other than vines, tubers, roots, or bulbs, be accompanied by a sworn declaration from the consignor, certifying (1) that the articles proposed to be imported contain no vines or cuttings, or portions of vines; (2) that the said articles were grown at a distance of not less than 60 yards from any vines or roots of vines; (3) that no phylloxera exists or has existed in the soil or in the neighborhood in which the said articles were grown; and (4) that the said articles are perfectly free from the pest known as *Phylloxera vastatrix*.

III. All packages, cases, pots, or coverings whatsoever, containing trees, plants, tubers, roots, or bulbs, shall, before landing, undergo a strict examination by a competent officer appointed for that purpose, to determine the absence of any vines, or portions of vines,

from the consignment, and, as far as possible, the absence of noxious insects and plant diseases hitherto unknown in this Colony. It shall be the duty of the consignee to open all such packages, cases, pots, or coverings, for the purpose of the examination aforesaid, and to afford every facility to the examining officer during his examination.

IV. On the examining officer being satisfied as to the absence of the *Phylloxera vastatrix* and of plant diseases hitherto unknown in this Colony, and, as to the sufficiency of the declaration in Section II above mentioned, he shall give a certificate to that effect to the consignee; and without such certificate no such articles shall be landed.

V. All trees, plants, tubers, roots, or bulbs which shall be found to be infected with the *Phylloxera vastatrix*, or any plant disease hitherto unknown in this Colony, shall be immediately destroyed.

VI. The Government does not hold itself liable for any loss or damage that may occur from the destruction of articles or from any process that may be considered necessary to discover the existence or otherwise of the *Phylloxera vastatrix* or any plant disease hitherto unknown in this Colony.

VII. The foregoing Import Regulations may, on application to the Secretary of Lands, Mines, and Agriculture, be relaxed so far as regards all trees and plants (other than grapevines) and tubers, roots, and bulbs destined for any area now proclaimed or that may hereafter be proclaimed to be an area infected with the *Phylloxera vastatrix*; provided, that all such trees, plants, tubers, roots, or bulbs shall with due dispatch be conveyed direct from the port of their destination in the infected area, and provided that they are free from any disease hitherto unknown in this Colony.

Another great assistance in the preventing of the introduction of foreign pests would be the erection of fumigating-houses at the different railroad depots, or at least at such of them as receive shipments of fruit, trees, and fruit packages. Here all infested stock could be treated at small comparative cost, and at much less labor than the same process now involves. In these houses should be provided all the necessary appliances for both fumigating and dipping, with facilities for retaining the infested stock until the Local Inspector is assured that it is clean from dangerous pests.

These measures, with the quarantine legislation we now have, would, if rigorously enforced, effectively prevent the importation of new plagues.

There is another point upon which I wish to touch in this connection. Some of our counties have passed quarantine ordinances designed for the protection of the counties in which they have been adopted. So far as these are supplemental to our State law, they are good, but as the State law covers the necessary ground, the inspector should operate under its provisions. No mistake can be made in this, for it has been passed upon in all its bearings by the courts, and declared constitutional. One of the severest tests of this law was in the trial of the so-called "Tahiti case," in which it was sought to destroy a large shipment of orange trees from Tahiti, infested with the mining scale, a pest not existing in California, and which, burrowing under the bark of the trees, it was not possible to reach either by dipping or fumigation. This case was brought in the name of the people and under the code to have the trees declared a nuisance and destroyed as such. After a hard-fought contest, in which the defendant importers were supported by the ablest counsel, Judge McKinley rendered a decision in favor of plaintiff, supporting its claims, and passing upon the validity of our quarantine law. I regret that the length of this opinion precludes my reproduction of it, but I quote some of the points of greatest importance to us who are interested in the protection of our great industry.

Among other things the Court declared:

"Every Judge is bound to know the history and the leading traits which enter into the history of the country where he presides. This we have held before, and it is also an admitted doctrine of the common law." (*Conger vs. Weaver*, 6 Cal. 548.)

The Court, therefore, takes judicial notice of the history, development, and character of the industries of California; of the fact that the production of fruits is one of the leading occupations in this State, and that a large portion of the people are dependent upon

it. It takes judicial notice of the fact that a large portion of the land in this and adjoining counties is devoted to the cultivation of citrus fruits, and that the annual production and shipment of oranges is very great, and that the spread of any insects injurious to citrus trees must necessarily result in serious injury to that business and in great loss and destruction to property.

That orchards and trees infested by scale or insect pests injurious to vegetation, and which will easily spread to other places, must be a nuisance *prima facie*, seems too clear to require discussion, and would not receive it at the hands of this Court but for the fact that this is the first case of this kind. * * *

It appears to me that this case belongs to that class in which, if the allegations of the complaint are true, a damage will be inferred, and it is not necessary to wait until it is actually done. It is similar in that respect to the cases in which diseased animals are taken to public places when there is danger of infection, to the cases of the storing of explosives, and to the cases of condemnation of dangerous buildings and places likely to be injurious to the health of the community—in all of which the abatement of the nuisance rests merely upon the reasonable apprehension of danger. The fact that the trees are at San Pedro does not prevent their being considered an existing nuisance, as the evidence shows that the larvae of the scale may be carried by birds, insects, and the wind to distant portions of the county and State. * * *

The defense claims that the trees should be separated and only those upon which the scale are found be destroyed. There is no doubt that the position of the defendants is correct; that in abating a nuisance no more property should be destroyed than is absolutely necessary for that purpose. But in this case the situation of these trees is such that there is no certainty that all are not infected, and if such separation can be made it should be done by defendants. * * *

From the evidence of the experts, and in the absence of any suggestion of a method by which the trees can be disinfected, the Court must conclude that it cannot be done without the destruction of the trees.

It therefore follows that the allegations of the complaint are sustained by the evidence. The Court is of the opinion that the statute of March 19, 1891, is constitutional, and that even in the absence of such a statute, the trees in question are a nuisance under the code, and that plaintiff is entitled to the relief demanded in the complaint.

Let findings and judgment be submitted in accordance with this opinion.

It would be well if we could secure the passage of a Federal quarantine law, and this measure is one that our fruit growers should labor for. We have general quarantine laws against infectious diseases, laws to prevent the landing of criminals, paupers, or other undesirable classes; we have a protective tariff to prevent the competition of foreign fruits with our own, but nothing to prevent the introduction of the greatest evil of all—destructive insects, pests, and diseases.

It is the little things in life which do the most damage; we can conquer the lion in our path, but the gnats overcome us, and so it is with the evils I have alluded to. Paupers and criminals, whom we exclude, would die out in a generation or two, contagious diseases would become eradicated, but these insignificant pests, many of them microscopic in size, once introduced are with us forever; they increase with alarming rapidity, and spread over the land with every breeze that blows, are carried by the birds and flying insects from section to section, and the ponderous power of man is futile against their depredations. What the exact extent of these depredations is cannot be told, but it extends into the millions of dollars. Wisdom requires, then, that both in State and nation we should take every precautionary measure possible to prevent the introduction of new troubles, to add to those which we already bear at such tremendous cost. I would therefore urge that our Congressmen be requested to use their efforts in framing and passing a general quarantine law, which, with our State laws and county ordinances, should effectually bar the entrance of new pests, and leave us to work out the problem of getting rid of those we already have.

DISCUSSION ON HORTICULTURAL QUARANTINE AND BENEFICIAL INSECTS.

PROFESSOR HILGARD: Mr. Chairman, the paper just read has such an evidence of truth on its face that I hardly think it worth while to discuss the nature of the measure proposed. That the State must protect itself, is clearly evident. The most important point, and the only point, is that the United States shall take a hand in this legislation. I regard here, that the regulation of interstate commerce covers also protection to the State, and United States legislation can regulate importation of fruit stock just as well as it can regulate the importation of anything else by interstate commerce. I think the suggestion of Mr. Craw a most timely one in regard to protection against some of these diseases. It is, perhaps, reasonable to afford a little consolation to our fruit growers by saying that some diseases that have been introduced were not able to propagate themselves in this climate.

MR. SPRAGUE: Mr. President, I doubt not that we are all agreed upon the exceeding importance of the recommendations of the paper; but there are some considerations which perhaps these introduce to our minds. First, it is desirable, of course, to make the law effective. A law without a penalty is very difficult to enforce, and hence this recommendation by the writer of the paper is evidently a judicious one. But on the other hand, it necessarily should be so shaped that the proprietor of the stock should be protected, so far as possible, from injury. Of course, the enforcement of any such law as this—the law of inspection and quarantine—over so large an area, and by so many different officers, is productive of a great deal of irritation. Very much of that irritation is due to the personality of the officers who are endeavoring to enforce it. They are indifferent, perhaps, to the rights of those concerned in the matter. The difficulty of securing the cooperation of the people interested is due largely to that one consideration, that they are not sure that they will not be subjected to the grossest injustice by the official whose duty it is to interpret the law and execute it. There are cases within our own personal knowledge, where large quantities of trees—and I do not refer now to the tree case in which I may have been somewhat interested, but to other cases in which large numbers of trees have suffered very serious and very unnecessary injury from the indifference of inefficient local officers. Now, I say that whatever resolutions are adopted in the convention, looking toward the enforcement of the law, or to the amendment of the law, making it more efficient, it is very desirable that in whatever is adopted there be an assurance to the owner of the property that he will not be needlessly damaged by the fruit men. I should be very glad, indeed, to see the closing recommendation of the report adopted. I think it would result in very great good to the people of California and to the people of the whole United States.

MR. BERRY: Mr. President, I am engaged in several industries in Tulare County. I am also the County Horticultural Commissioner of that county, and my duties are such that it takes me all over that county, and brings me directly in contact with the fruit growers, and my observation and experience in reference to these insects pests throughout the State perhaps will interest you. Some three or four years ago in Tulare County, the pernicious scale seemed to take possession of the county. There had been nothing done whatever to hold it

in check at that time. It was called the San José scale, because it was said it had been introduced on trees brought from San José, and San José got the reputation of introducing the scale into Tulare County. It became so bad, without any attention being given to it, that those gentlemen who were engaged in the industry of fruit growing in Tulare County were about to become bankrupt, in consequence of the poor quality of fruit they were producing. It seemed to attack all kinds of deciduous fruits. At the suggestion of Mr. I. H. Thomas, a composition of sulphur, lime, and salt began to be used throughout that county, and to a great extent it kept that scale in subjection. But it did not eradicate it, and it cost a large amount of money to even hold it in subjection. That money the fruit growers had to put up. The remedy was a good thing when properly applied, but the trouble has been—and I have found it to be so and believe I voice the sentiments of those who have come in contact with the fruit growers—that the difficulty of instructing the operator how to prepare the material and apply it is very great. You may stand over your boiler and boil the material for him and instruct him with the utmost care how to apply this preparation, and he will come back to you and say to you that your stuff is no good. He insists that he put it on just as you told him to, but you know that he has not done it right, because, if he had, he would have had the benefit of it. So that in my experience, when we were attacked by one of these insects that destroys all fruit trees, it was necessary to use some sprays and washes, until we can find some other remedy. In Tulare County last year there was known to be in large sections of certain localities, several species of beneficial insects which cleaned the orchards of scale. We certainly thank some one for the benefit we have derived from the introduction of these parasites. It was decided at the meeting of horticulturists of Tulare County last year, that to continue spraying would destroy our fruit, which would be more beneficial to us than destroying a part of the scale. It was thought to be a good business proposition to abstain from spraying. The result has been that these parasites have spread over our county, until we have hardly any pernicious scale at all. Certainly the orchards are benefited by the introduction of these parasitic insects.

But now we are engaged in the industry of growing citrus fruits, and we are scared to death on account of the red scale which exists in Southern California. I must confess we are very much frightened. Along comes a box of oranges out of this section and they are covered with red scale. We sit down on the oranges and throw them out, but that does not keep the scale from coming into our county. No matter how strict the railroads are, we cannot prevent a passenger coming into our county and peeling an orange and throwing away the skin where it will come in contact with the trees, and the scale will be left. Really, I see no way how the quarantine laws are to prevent the spread of these pernicious insects. They have cost every fruit grower and every nursery man in the State hundreds of thousands of dollars to keep them in subjection, and the best remedy that they have had thus far has been the introduction of parasitic insects.

I believe, gentlemen of this convention, that if our State Board of Horticulture use their efforts and make some failures in regard to not introducing the parasitic insects that will accomplish everything at once, it is no reason why the fruit grower of the State of California should

say they are delinquent in their duty, when they are making the effort to introduce all good parasitic insects.

I stand here to-day as a representative of the fruit growers of Tulare County, and my observation as such, in the State of California, leads me to make this statement—I stand on this ground, that the only cure is something in nature better than that which man invents. Now, I consider it a good thing, when we have not discovered something in the shape of these insects to help us out, to keep up our spraying. I believe if you will pay more attention to the laws that govern nature in the introduction of such insects, that it will cost less money to find something of that kind than it will to keep up your sprays on the trees all over the country. I defy any one to apply sulphur for less than \$10 to \$12 an acre, which is for the application of something which does not kill that pernicious scale. It only kills part of it, and next year you have to do it over again. By the introduction of the ladybirds and other scale-destroying insects, while you are asleep, while it rains, while the sun shines, they are performing the work for you, actually performing labor that it would cost you a great deal to perform, and that you do not accomplish successfully by spraying.

In regard to the red spider. As you in the San Joaquin Valley already know, this is going to be a very serious thing to us. Some day many people in our valley will not raise lemons at all. When you think that every pair of them hatches out 300,000 more, and that each pair of this 300,000 hatches out 300,000 more, you can understand how rapidly they will multiply. We are fighting them with a spray. The last man that comes along with a preparation we buy that. It does partial good, but you have to go on with your spray and continually apply it, or otherwise you do not accomplish anything. We found that sulphur was the best of all, and now we apply sulphur, and it is a very good remedy. But I believe that sulphur will have to be applied every year. How much better it would be to introduce a parasitic insect, and eat up the red spider and do away with it at once.

While I am on the floor, I want to bring up a subject that pertains to these insect pests of California; and while it has not been mentioned by Mr. Craw, a gentleman I have a great deal of respect for, it has agitated us. It is root knot. I know we are going to have a lot of theories in regard to root knot, but I stand in such a state of confusion that I have no theories left. We have talked to our scientists, we have had professors of entomology to visit us, we have partaken of their knowledge, and it has amounted to nothing. We have tried experiments of our own, and they amount to nothing. We are at sea; we recognize it, but the destruction is going on all the time. Peach trees in the orchards in our valley have been blown over right at the ground. No man can afford to raise fruit and have his trees destroyed in five or six years. There is one orchard in our district, consisting of 11,000 trees, which is now eight years old, and prune trees bear in our county in the third year. These trees are now eight years old and they have never paid the cost of cultivation. They have been destroyed by the root knot. They are all destroyed, comparatively speaking, as far as their productiveness is concerned.

MR. SPRAGUE: Have you found any cases, where the trees were planted entirely free from any suspicion of root knot, that afterwards developed it—after the trees were planted?

MR. BERRY: Yes, sir.

MR. SPRAGUE: Do you throw out the whole consignment of trees if you find a tree or two affected with root knot?

MR. BERRY: I will explain that to you. We found in some instances where nurseries had been affected with this knot and the knot had grown partly out on the root of the tree, that after that part of the root had been cut off by a clean cut, the disease was still left and those trees developed the root knot after they were planted. I will give you an experiment which I tried last year. I planted ninety trees that had the knot on. Before planting, I carefully removed the knot. I used a fungicide on the wound made by removing the knot. I carefully took clean, healthy bark from clean, healthy tree roots, and carefully grafted the bark on these roots where this knot had been removed, where the wound had been, and I carefully planted those trees. They grew very nicely, and as nicely as any other trees. When Professor Woodworth, from Berkeley, was down in Tulare County, we took those trees up, and on every one of them the knot had oozed out at the crack where the joining was made between the section broken and the new bark, and it was just one mass of small knots. This indicated to me that the disease was in the sap of the trees. Along came another man, and he said that this was in consequence of irrigation. We do not irrigate. How do you account for that? Another man says it is a bug; another man says it is a worm. And so it goes on, one has one theory and one has another; but one thing we do know, and that is that in the orchards where it is it has seriously injured our trees. Now, we are going to be affected by the codlin moth. Tulare County has the reputation of raising some of the finest apples in the State. Yet the codlin moth is going to destroy them. The pears are affected by it. Now, if we can introduce, through the State Board of Horticulture, or by any gentleman employed by them, anything that will be of as much benefit to the growers of the apple and the pear as the parasitic insect that has destroyed the cottony cushion scale, I say, on the part of the gentlemen belonging to this Fruit Growers' Convention of California, it behooves them to take action, and to urge free and continuous action in that direction, to bring other insects here into California [applause]; and I hope that this convention will, before it adjourns, by a series of resolutions, adopt something of that kind, urging it strongly upon our State Board to pursue their experiments in that direction. [Applause.]

JUDGE HEATH, of Santa Barbara: Mr. Chairman, I have, in connection with this matter, a resolution which I desire to introduce, and will ask Dr. Perkins to read it.

DR. PERKINS then read the following resolution:

WHEREAS, It is now apparent that the best method of overcoming the various insects, such as scale and others, so detrimental to horticulture, is by the introduction of parasites; and whereas, the efforts of the State Board of Horticulture, in the introduction of such parasites from foreign countries, have been eminently successful; therefore,

Resolved, That it is the wish of the convention that the Board should continue its experiments in this line, and that it should receive the support of all those so intimately connected with the prosperity of horticulture. To this end the convention earnestly requests the Legislature, at its next session, to appropriate a sufficient sum of money, not less than \$10,000, to be expended in the discovery and importation of insects beneficial to horticulture in this State, and that the Legislature provide that the importation and culture of such insects, and the expenditure of such sum of money, be voted to the care of the State Board of Horticulture.

JUDGE HEATH: I wish to say, Mr. President, that among the fruit growers of California (and I have been one, that is to say, interested in the fruit industry, since 1859) I have seen the necessity of keeping our orchards free from pests, particularly the citrus fruits in my location. The other fruits are not affected, but the citrus fruits are. We have been to great disadvantage in spraying and watering the trees. It is almost impossible to eradicate the pests from large trees. I have lemon trees twenty-seven years old, and to fumigate such trees I might as well cut them down as far as profit is concerned. With a tree of that kind it is almost impossible. Now, in later years many orchardists are setting out different varieties of citrus fruit, and we have a pest in Southern California which has cost us thousands upon thousands of dollars, and we are not getting rid of the pests yet. But within a few years, and with the aid of the State Board of Horticulture, we have succeeded in getting an insect which is materially aiding in exterminating the bug on our deteriorating fruits. We had an appropriation from this State, and through the State Board of Horticulture an officer was sent by the United States Government to import the bugs from Australia. The last Legislature, unfortunately, made no appropriation, and we simply have the insects that were given us before. My desire in introducing this resolution is to lay the foundation for another appropriation to uphold the hands of our State Board in their energies and efforts to rid the State of other pests. I recognize that Southern California is to be the great fruit belt of the United States, and we must, of necessity, protect our orchards, or our energies will necessarily fail. The State has authorized the State Board of Horticulture to go ahead. Now, let us come in and act with that head, and let us uphold the State Board and its agents, and let us save our orchards and furnish the world with the best fruit that can be raised. [Applause.]

MR. COLLINS: Mr. Chairman, I move to strike out two words in that resolution; that is, "eminently successful," in the preamble.

JUDGE HEATH: Well, sir, perhaps I have drawn that a little too high. I say eminently successful on this ground: The few insects that we have been able to get from Australia—we know that the cottony cushion scale has almost entirely been eradicated; we know that the black scale has now disappeared in many orchards. I know that from experience in my orchards and the orchards of my neighbors. While the time has not arrived when all the insects are destroyed through any process of destroying, I think if we will give them time they will be entirely destroyed. I do not stand upon one or two words, but I do not think that those words ought to be stricken out. If the convention thinks proper, all right, I am satisfied. If the State Board of Horticulture, whose energies are spent in this respect, are assisted; if our Legislature will give us the paltry sum of \$10,000 in the interest of the orchards—I say we ought to ask for more money, but we are willing to take the paltry sum of \$10,000. I say the time is coming, and it is not far distant, when California will be entirely rid of these pests by the action of the State Board of Horticulture in this matter.

MR. ADAMS: Mr. Chairman, I want to ask how much it has been estimated has been saved the State, in money value, by these insects which have proved successful?

MR. BERRY: It is incomputable.

MR. ADAMS: One hundred thousand dollars? One million dollars?

MR. BERRY: Yes; several million dollars.

MR. ADAMS: If this is the case we might call it eminently successful.

MR. CHAPMAN: Mr. Chairman, I would like to say that as far as my ranch is concerned, if it had not been for the *Vedalia cardinalis* I would not have had any oranges at all. For the past season I have been able to pay the railroad company \$250 per acre for freight, simply by the introduction of this parasite.

MR. BERWICK: Ten thousand dollars may be a paltry sum, but it would not be to me. The last expedition cost, I believe, \$3,700. Why should the next expedition cost more? We might get \$3,700 from the Legislature; we might not get \$10,000. I believe in using public money as if it were our own private money, and not asking for more than we want.

MR. MASLIN: Mr. President, appropriations are generally made for two years. Do not let us ask for that which we can get, but for that which is sufficient. The essential thing is that this convention appreciate the efforts of the State Board of Horticulture. When it comes before the Legislature that body will inquire into the operation of the law, and how much can be or will be needed. We probably cannot get \$10,000, but it is well enough to put it in.

JUDGE HEATH: I want to say that the reason for putting in the sum of \$10,000 was that I have been in the Legislature and represented my county various times. These appropriations are made for two years, as our Legislature meets once in two years, so that the \$10,000 being voted, it would be \$5,000 per year. Now, it is true that with the appropriation of \$5,000 some years ago, some insects were introduced that proved of great benefit to the fruit growers of this State. It was a new thing, gentlemen; we were struggling against what we supposed to be fate. Many orchards in this State have been entirely killed. You need not go far from the City of Los Angeles, right now, where the orchards were prosperous, to find where they have been almost entirely a failure. The State is losing nothing by an appropriation of \$10,000, and I want to say that when I was in the Legislature of this State, and asked for an appropriation on such grounds, I have never been refused. The great heart of California will never refuse Southern California \$10,000 to increase the State's value for business purposes \$2,000,000.

MR. BOYD: I move that the resolutions be referred to the Committee on Resolutions.

MR. MASLIN: I would like to amend by instructing the committee to report this afternoon.

MR. BOYD: I accept the amendment.

Adopted.

CLAIM OF YOUNG & POWERS.

MR. YOUNG, of the firm of Young & Powers, attorneys, was permitted to address the convention as to a bill due them from the State Association of County Horticultural Commissioners.

MR. STABLER: Mr. President, it may be proper, at this time, for me to say a few words supplementary to what Mr. Young has said, as I have followed this matter very closely and am now Secretary of the State Association of the Commissioners. I think it very proper to bring the

matter up at this time. Four years ago, when a Fruit Growers' Convention was held at Los Angeles, this matter of trying to pay this bill was first agitated, and the County Horticultural Commissioners started in to draft a bill. At the next convention, at Santa Cruz, a year later, or three years ago, the matter was brought up again. A committee from the Fruit Growers' Convention and Convention of County Horticultural Commissioners joined, and they drafted a bill, and a committee from the Fruit Growers' Convention, consisting of two attorneys, thought the bill was not constitutional. It was decided that the bill was not properly drawn and it was necessary to have the bill drawn by a regular attorney. At that time a committee was appointed by the fruit growers here to appoint an attorney to draft the bill, and go to the Legislature and try, if possible, to secure its passage. I would state further, that a committee of the State Fruit Growers was appointed for that purpose. That bill was given into my charge to introduce, and Senator McComas of Los Angeles introduced the bill into the Senate. It was very necessary to have the assistance of the attorneys at that time, from the fact that on a second reading the bill was amended, generally by members from mining and stock counties, who had no interest in the matter and yet had certain amendments they desired to insert—amendments which would have killed the bill. Mr. Young on several occasions came up and appeared before the committee and asked for the passing of that bill. The horticultural committee of that Assembly was not in favor of passing the bill. It was pretty hard to get the horticultural committee to report the bill back to the house, but we got it reported. A committee from the fruit growers stayed there and watched that bill and worked hard. In the case which was tried in this vicinity, in which over a quarter of a million trees infested with orange scale were treated under this measure, Judge McKinley, of Los Angeles, held the bill to be entirely constitutional. What I wish to say is this: It required, of course, an expense in this matter. The committee of fruit growers guaranteed \$500 if they would go up there and secure the passage of the measure—Powers & Young were guaranteed \$500 if they would act as attorneys in this matter. They have not been paid. At the Marysville convention this matter was brought up as it has been to-day. It was indorsed by the convention. Gentlemen from all over the State pledged themselves to raise certain sums of money and help defray the expense. They have not done it. There is still due \$500. At the San José convention, although I was not present, I know that this matter was brought up, indorsed by the convention, and the amount pledged throughout the house. The members who pledged themselves were members of the State Horticultural Commissioners. That is certainly a complete indorsement of this measure, and we feel that it is due that some action should be taken. Now, the attorneys in this matter have taken some action. They have served me and other gentlemen with summons and complaint. We would like to see this convention take some action and settle this matter.

MR. SPRAGUE: Mr. Chairman, I recognize fully that the sentiment of this convention is in favor of the motion which it is decided to put before the convention for the payment of this money; but, sir, I beg your indulgence, while I make a protest against such action. It is not that we do not appreciate in the highest degree the intention of this resolution, but it is, sir, that the whole matter of bringing it before this convention

and soliciting the payment of this money by this convention for services that are not directly traceable to the demand of this convention, is entirely wrong, sir. It is a most dangerous precedent. What do we see? We see the members of the Legislature of the State of California entirely ignored as to their ability to prepare matter for legislation, to see that it goes properly through the several committees and is laid before the Assembly. Is it presumed that there is not sufficient ability among the Legislature of California? Do you from Southern California send no men there who themselves understand the proper preparation of legislation? The thing is absurd. I challenge you to find any such precedent in any other State of the Union. It is entirely wrong and a most dangerous precedent. The payment of a lobby to go to Sacramento to see that a certain bill, which is absolutely necessary to the existence of horticulture in this State, goes through. It is, then, ridiculous, and if we put ourselves on record in paying for this kind of service, we, ourselves, join in the complicity.

MR. ADAMS: I have always felt that the proposition that the State horticulturists should pay this bill, which has been brought up in the various conventions, was wrong. Gentlemen, I have changed my mind. I am satisfied that it is exactly right. I am satisfied that it was not improper. I am satisfied that it was necessary. I am satisfied that the indebtedness was incurred with a full pledge, so far as any of these conventions can pledge the horticulturists of the State to stand by anything; and I say, if the horticulturists of the State do not stand by the committee appointed to help them, and which did labor for them to the best of their ability, it is a shame. [Applause.]

MR. SPRAGUE: If it is true, as this gentleman states, that this was done at the command of this convention in previous assembly, then I withdraw all objections.

MR. LELONG: I can explain something about this bill and stop the discussion, and get some money. At the time this came up in the convention at Marysville, different representatives of different counties were asked if they would guarantee certain amounts in their counties. Some said they would. Afterwards a list of counties was brought in and they were asked if the amounts had been collected. Some replied that they had paid, and others were not paid. If Mr. Stabler will present that list, and if those people will rise and say whether they have collected in their county, it would settle the question.

MR. COLLINS, of Ontario: As Mr. Lelong has said, the question is how to raise this money. San Bernardino County was assessed \$70. We have paid \$189. Now, if the other counties will come forward and do something like that this question can be dismissed in a few minutes.

Action on this matter was postponed.

THE OLIVE WITHOUT IRRIGATION.

MR. CALKINS, of Pomona: Mr. Chairman, I have here a sample of olives grown without irrigation, which I would like to show to prove that in some localities it may be done without irrigation. They were grown north of Pomona, above our water line, and have never had any water.

QUESTION: What is your average rainfall?

MR. CALKINS: The rainfall for the past five years has been between 8 and 20 inches..

MR. BERWICK: What was the crop to the tree?

MR. CALKINS: There are about four hundred trees, and there were about ten tons last year.

QUESTION: How old are the trees?

MR. CALKINS: They were part of them five, and part of them six years old.

RESOLUTIONS.

MR. SNOW, of Orange: Mr. Chairman, I have a resolution I wish to offer, relating to attacks made on the State Board of Horticulture.

THE CHAIRMAN: If you have no objection it is referred to the Committee on Resolutions.

The meeting then adjourned till 1:30 this afternoon.

XXV.

AFTERNOON SESSION.

Vice-President KINNEY in the chair.

The convention was called to order at 1:30 P. M.

THE CHAIRMAN: The first business of the convention this afternoon will be the report of the Committee on Resolutions.

MR. GRIFFITHS, Chairman of the Committee on Resolutions, reported that four out of the five members of the committee, the fifth member being absent, were unanimously in favor of the resolution introduced by Judge Heath at the morning session, which had been read to the convention, and he moved, as the sentiment of the committee, that the resolution be adopted.

This motion was seconded, and on being put to a vote, was unanimously carried.

MR. GRIFFITHS: As to the second resolution, introduced by Mr. Snow, the committee beg to say that they are not quite ready; they have not yet been able to get together, and would like to keep that resolution until to-night.

FRUITS AND SOILS OF THE ARID REGIONS.

By PROFESSOR E. W. HILGARD, of Berkeley.

I wish to call the attention of the convention to some points in the researches of the California Experiment Station, and particularly in regard to some very striking differences between the results of investigation in California, and in Europe and the East. It is often attempted to apply European and Eastern experience and data to Californian practice. I desire to show what I observed in beginning the work of the

station seven years ago, namely: that the difference in the nature of soil and products is so great that we must be extremely cautious how we attempt to apply Eastern practice to this country. We apply to the countries where the rainfall is deficient, or falls in only one season of the year, the term "arid regions," without intending to cast any reflection upon those regions, while the other portion of the country—Europe and the country east of the Mississippi—is called the "humid regions."

One point I wish to call attention to in the beginning is the historical fact, which may or may not have struck some of you before; namely, that the oldest civilizations of the earth developed in the arid region. Where do we have the oldest civilization? In India, Persia, Egypt, in the old continent; and the highest civilization was developed on this continent, as far as we know, on the plateau of Mexico, and in Chile and Peru—arid lands in every sense of the word, regions of deficient rainfall, with all its consequences. It has often been asked why these nations chose for their development the region that seems to offer so little inducement. It does seem that we ought to prefer to live where nature does the irrigation for us, and it seems rather an incomprehensible selection that these ancient nations have made, particularly as regards Egypt more than India. True, in India there is a humid and an arid region, but the arid region is the one that has reached the highest grade of civilization—the northern portion of India, which embraces the most celebrated cities and regions of Indian history and mythology.

I think the table before you helps somewhat to solve the question. This table is based on results of about one thousand analyses of soils, which have been made largely under my direction, and precisely by the same methods throughout.

Average Composition of Soils in the Humid and Arid Regions of the United States.

Name of State.	No. of Soils Averaged	Insoluble Residue	Soluble Silica	Total Insoluble Residue and Soluble Silica	Potash	Soda	Lime	Magnesia	Brown Oxide Manganese	Peroxide of Iron	Alumina	Phosphoric Acid	Sulphuric Acid	Water and Organic Matter	Total	Hygroscopic Moisture	Temperature of Absorption, C	Soluble Phosphoric Acid	Humus	Carbonic Acid	Available Inorganic Matter
North Carolina	20	81,627	8,505	85,138	145	657	688	680	671	4,718	5,713	118	661	8,977	100,183	4,282	21.1				
South Carolina	11	83,468	8,425	88,919	123	659	114	155	683	2,771	5,708	697	108	8,899	100,039	4,228	23.6				
Georgia	40	86,066	2,887	88,954	150	685	676	699	690	2,751	5,708	111	108	8,914	100,029	3,541	17.4		4,383		
Florida	7	84,277	1,772	86,469	101	684	691	627	677	749	1,148	691	689	8,914	100,138	2,294	24.4				
Alabama	50	81,576	4,868	86,469	231	673	168	210	120	8,614	2,699	184	693	4,036	100,011	7,068	20.2				
Mississippi	97	85,870	4,381	89,714	276	109	145	312	137	2,643	4,069	691	629	8,931	100,176	6,410	15.4		.680		
Arkansas	38	88,539	1,65	88,539	165	666	681	430	205	3,099	8,511	150	645	8,704	99,931	2,473					
Kentucky	185	86,719	199	86,719	104	681	681	193	197	6,008	3,523	109	638	8,691	100,862	1,845					
Louisiana	13	78,388	6,857	85,231	230	686	163	379	153	4,543	5,667	129	687	8,480	100,261	6,656	24.5				
Total for humid region	466	84,031	4,212	87,687	216	691	108	225	183	8,131	4,296	113	652	8,644	100,178	4,650	18.5		2.39		
Averages by States		84,472	3,873	88,126	187	671	112	209	126	8,455	4,008	114	695	8,567	100,048	4,189	20.9		2.53		
California	198	67,882	8,960	76,842	644	277	1,075	1,488	663	6,303	8,721	683	648	4,896	100,048	5,925		.08	1,040	1,148	.48
Washington	73	75,021	8,673	78,696	777	249	1,373	1,171	606	4,580	6,063	173	628	5,226	99,962	5,911			1,155	403	.67
Montana	39	66,141	6,285	72,376	1,005	226	2,483	1,494	687	4,459	7,145	178	629	7,183	99,985	8,712			8,321	2,398	1.82
Total for arid region	313	70,565	7,266	78,185	729	264	1,862	1,411	650	5,752	7,988	117	641	4,945	99,968	6,281			1,839	1,316	2.32
Averages by States		69,681	6,289	75,632	825	251	1,645	1,384	656	5,431	7,309	144	636	5,585	99,978	6,859			1,830	1,316	2.32
Utah	1	79,20	4,70	83,90	709	404	1,287	849	619	7,770	1,477	160	603	8,707	100,282						
New Mexico	1	63,20	7,82	70,52	733	176	10,060	1,007	602	4,031	2,560	108	682	8,197	99,849						
Colorado	1	69,61	11,12	80,73	964	113	705	845	606	6,640	5,560	690	633	4,480	100,117						
Average of the three		70,67	7,71	78,38	801	231	971	900	615	6,147	8,199	117	639	8,778	100,099						
Wyoming	9	75,79	2,46	78,24	72	47	2,67	1,45	-----	3,32	5,85	18	10	4,79	99,69					1.90	

*Omitted in the average.

I should here say that if you have any special soil and analyze it by two or three different methods, you can get as many different results, and results which contradict each other; so that unless the investigations are made in every case in precisely the same manner, no comparison is possible. That is the reason why, notwithstanding a large number of such analyses have been made heretofore, this is the largest existing set of analyses of soils that are strictly comparable. These comparisons there can be no question about, and I will call your attention at the present time to the extraordinary coincidences from distant regions.

The data of the upper portion of the table, in the humid region, were obtained largely in connection with the census of 1880, when I was in charge of the work on cotton production in the Southern States. You see, the States mentioned there are the Cotton States. I resided there for eighteen years, and therefore was able to accumulate a large amount of information in regard to the climatic conditions of that country. The analyses of Mississippi, Louisiana, and Alabama were made directly under my own supervision, and others under my general orders.

Now, I wish to call attention, in this table, mainly to the substances which have been marked in red. They are phosphoric acid, lime, and potash. The amounts found in the soils have been averaged, and you see the total averages of the same in four hundred and sixty-four analyses from the humid region of the United States. If you look through the averages for the several States, you will find in these columns remarkable coincidences throughout. They do not differ in the general averages of the same substances in any material degree. For instance, the humid regions for potash, you will have an average of about 0.22 per cent. There are, of course, soils of the humid region which reach above that. For lime, the average is about 0.11, or one tenth of one per cent.

Now, stop a minute with these two exceedingly important substances. Come down to the averages for the arid region, and you observe how widely the figures for the arid regions differ from those of the humid region. Making an average of the whole number of 319 analyses, we have for potash, instead of 0.22 per cent, about 0.8 per cent, approximately three times more than the humid region. For lime, we have from twelve to fourteen times more.

We may average these analyses by States, by averaging the figures for each of the States represented—that is a mode of looking at it, which is justified by the facts, as the analyses of these soils were made with a view of being representative of the States from which they were taken. The samples from Florida were taken so nearly representatively, that later analyses made by the chemist of that State do not vary to any material extent, the average remaining the same as here shown. Reckoning, therefore, in two ways—by the whole number of analyses, or by averages of States—you observe that whichever way you take, the same result comes out. The figures are slightly changed, but the general result is the same. In the humid region the result for potash is about one third; in lime, it is approximately the same as before—twelve to fourteen times as much lime in the arid region as in the humid region.

The absolute amount of lime in the arid region is about as much as is ever of any use. As a rule, more lime would be perfectly useless in the soils of the arid regions, for they average as much as $1\frac{1}{4}$ per cent. That has been shown by experimental tests at the Experiment Station,

and in private experience, over and over again. In consequence of this heavy proportion of lime, the addition of lime to our soils is useless. Only when the soils are very heavy, it may be desirable to apply a dressing of lime.

The same naturally applies in a measure to potash, the other substance which in the humid region, as well as lime, has been found exceedingly efficient as a fertilizer. Lime is, as all of you know who come from the other side of the mountains, an exceedingly common and effective means of improving the land; it has been tried over and over again in this State, both at our stations and by private parties, and unless the lime that was used contained other substances, the result has been practically *nil*. What applies to lime would naturally be supposed to apply also to potash, while soils are fresh.

As to phosphoric acid, there is no material difference between the humid region and the arid region.

The average for the arid region (embracing California, Washington, and Montana) and for the humid region are practically identical.

Now, let us see why this difference should be. As to potash, it is perfectly evident what it comes from, because the combinations of potash, the sulphate, muriate, and caustic, and carbonate of potash, the usual forms, are all soluble in water. In the humid region, this potash is constantly being removed by the process of rain water leaching the soil. But this is not the case in the arid region, where the rainfall is deficient. The potash stays in the soil and enters into combinations, from which, however, it is readily liberated by plants. In the humid region it is effectually washed out, and so continuously that it is difficult to find in the drainage of the waters of the humid region—for instance, on the other side of the Mississippi—more than a mere trace of potash salts. It is quite otherwise in the waters of the arid regions. If you investigate the waters of any of our arid streams, they contain a very notable proportion of potash, as compared with other contents. River water is supposed to contain from 4 to 12 grains of saline matters. Well water contains as much as from 12 to 25, and even 30 grains. In the case of well water, the largest proportion is lime and magnesia. In river water, the predominating matter is usually salt of some kind, chiefly of soda—common salt—and salts of potash. The leaching process produces the same effect upon lime, but not so much so. That lime is soluble in water all are aware. Any one who has examined the bottom of a tea-kettle is familiar with the crust that forms and often causes it to be burned through; which is mainly compounds of lime and magnesia, which boiling brings down to the bottom of the tea-kettle. Lime, then, in the shape in which it appears in well water, is soluble in water. Therefore, when there is a large rainfall, and when that rainfall takes place during the high temperature of summer, the lime is leached out of the soil, and in the land of the humid regions it is leached out to a greater extent than is potash, for the reason that it does not enter into combination as readily as potash. In the humid region the measure of the first productiveness of all virgin soils is the lime, and may be measured in the light of the proportion of this ingredient.

Probably most of you who have had some experience in the East know something about the blue-grass region of Kentucky, and if so you have heard what is a common saying in all the Southern States, that a limestone country is a rich country. That is true almost without exception.

If you cross the Southern States in any direction, you will find rich streaks and poor streaks, and just as soon as you strike a rich streak, people say there is limestone underneath. In Mississippi, if you go from the east to the west in the northern part of the State, you will find alternately very rich and poor streaks, about twenty-five miles apart. Rich streaks are the boundary of the country called the lime country. Poor streaks are the pine country. We can tell from the presence of certain trees that there is lime in the soil. Now, this goes to show that all the soils in the arid region, except those in the high Sierra, are lime soils, and by parity of reasoning we might apply, and doubtless can apply, the adage of the humid regions to this country, and say that if limestone soils are rich soils, arid countries are rich countries. I think herein lies the explanation of the fact I mentioned at the outset: that the oldest civilizations have developed, historically, where aridity is the rule. In Egypt, Persia, and Northern India, everywhere, we find that an arid climate prevails, and that there civilization is the oldest, and everywhere there is a lime soil. That is at least *one* reason why the ancient civilizations have established themselves by preference in the arid regions, because irrigation of them, though costly in its first establishment, provides a much better sustenance to a much denser population than is possible in the humid regions. In the latter, fertilization is very soon necessary. In the pine region of the South the average duration of a virgin soil after the forest is cut down is from four to five years. Then it gives out and will not raise a profitable crop. When you go farther, to the prairies beyond, you find that the lands took thirty and even thirty-five years before they wore out so that fertilization became a necessity.

You have heard it said that in Egypt the overflows of the Nile keep the soil fertile. To some extent that is undoubtedly true, but you must remember that the overflowing of the Nile only lasts from two to three months, and the rest of the time the climate of Egypt is as arid as any one could desire. And what examinations there are of Egyptian soil, confirm what is given in this statement: that the soil contains a large amount of lime and potash, but a comparatively small amount of phosphoric acid—the three ingredients we are at present discussing. The same is true of India.

While in England, a short time ago, I spoke with an English chemist who had been sent by the British Agricultural Society to investigate the soils of India. Although his investigation had not been carried very far, a few analyses had been made, confirming the investigations I have made here with regard to the soil of California and the arid climate of the West. I say "I," because the arid regions have not before been investigated systematically and scientifically.

Although old civilizations did take possession of the arid regions, they were not the civilizations which pursued scientific investigation. These investigations have until lately not been made, except in California. Egypt has not been a source of scientific investigation, nor Persia, nor India, nor those other countries, for the simple reason that they are countries relatively inaccessible, and scientific investigation was difficult, on account of the constant upsettings in a political way. In fact, it is even now very difficult to get any data from them. There is one country in which alkali occurs, which has been within the limits of civilization for a thousand years; and yet it has not been investigated, and that

country is Hungary. I have lately called the attention of the Hungarian Government to this fact and to the analysis of the arid lands of Hungary. I found that it is a historic fact that the arid region of Hungary has been occupied by gypsies, and other people do not care to settle there. And now the Government is investigating the question of reclaiming the alkali land. They have alkali land, exactly as we have in this State, and this land is just as rich as can be, provided you can get rid of the surplus alkali. Alkali is peculiar to the arid regions, and the reason why the alkali is there is not that there is a special abundance of it in that soil, but it is simply that it exists originally in all soils, humid or arid, in the form of rocks, which ultimately go into the soils—they *remain* in the soil of the arid region, while they are washed out of the soil of the humid regions.

Let us see what is the composition of this alkali. If we look at the final result of the leaching of the land, we find it in the ocean. In the ocean we have the last outcome of the leaching of the land, because all the water that flows from the land finally reaches the ocean, and with it everything that is permanently washed out of the land. I have not a table of the composition of sea water, but out of $3\frac{1}{2}$ per cent of solid matter about $2\frac{1}{2}$ per cent is salt; the rest consists of gypsum, chlorid and sulphate of magnesia, and a certain amount of potash salts, but very small compared to the amount of soda. The reason of the large amount of soda compared with the amount of potash and lime in sea water is obvious: the soda is washed out of the land, while the lime and potash remain behind in a large proportion, notwithstanding that they are quite soluble. Here I have analyses of some California alkali, the alkali that most of you dread so much, and would like to do away with altogether.

Remember now, the three mineral substances that are of chief value in fertilizing are potash, lime, and phosphoric acid; nitrogen is another highly important element, and the most costly of all. Keeping this in mind, I call your attention to the table showing the composition of alkali salts from different portions of California; I have added some from Washington and Montana—it is the same there, the same in Egypt, in Hungary, in Algeria, as in the San Joaquin Valley. These analyses show the composition of 100 parts of alkali salts leached out of the soils; the latter contain, on the average, about a quarter of one per cent of them. Take the alkali salts from Tulare County; you have here in that from Visalia, $6\frac{1}{4}$ per cent of pure potash, equal to over 20 of the best potash salts you can buy; there are also nearly 3 per cent of phosphoric acid. The alkali salts from our Tulare Experiment Station also contain wonderful proportions of these ingredients: $1\frac{1}{4}$ per cent of potash, over one per cent of phosphoric acid, nearly 20 per cent of Chile saltpeter or nitrate of soda, which would cost you from $3\frac{1}{2}$ to 4 cents a pound, and besides a per cent and a half of ammonia carbonate. Such material would be worth about \$8 per ton as a commercial fertilizer; for these ingredients are what we pay for in the latter. This table was not completed when I took it down to bring it here; I could extend it to the end of the room, showing you the same facts repeated elsewhere. You perceive that the alkali is very far from being an unmixed evil, if you can subdue the evil effects of sodium salts—the carbonate of sodium, common salt—and glauber's salt. The alkali soils then show extraordinary fertility and durability.

I will remark that in India, as in Egypt, there is a region which has been cultivated from time immemorial, where very little fertilization is required. It is on the highland in the middle district of Hindoostan. There is a heavy adobe. It is usually underlaid, at a depth of about six feet, by a loose sand. Into that sand, when the rain falls, enough alkali drains off to keep the adobe from being alkali. That has been cultivated as long as we have any history of India, without being fertilized at all.

I have in this table some results of analyses from Utah, Mexico, Colorado, and Wyoming. They are made by substantially the same method which I have adopted. They correspond almost exactly with the general results I have shown for Washington and California. There is no question about it. It is a universal fact, about which there can be no doubt. So far, then, you see that there are certain substances in the soils of the arid regions, not in California only, but all over the world where they exist, which are retained in them because they are not leached; and while phosphoric acid is not in this category, because it forms an insoluble compound, it is certainly true for potash and lime.

In regard to the bottom soils—say the bottom soils of Riverside—let us see how this is. If you go to the creek bottom just beyond Rubidoux Mountain, at Riverside, you see an abundance of alkali in that little bottom. Riverside is free from alkali on its upland, because enough rain falls to wash out a good deal of it, and irrigation is practiced to such an extent that the alkali is washed into the valley. Nevertheless, not all the alkali is washed out of the soils of Riverside. That is why I have said you had better spend money on phosphoric acid and nitrogen, and not on potash, until you find that such fertilizers fail. While potash is being washed out of the soil by every rain, and it hardly seems reasonable that you should have to supply it.

The general truth holds good that potash and lime are very abundant in the soils of California; unfortunately, as you see by the general average of California in the table, phosphoric acid is relatively deficient. In Montana, the average is nearly double that of California. Therefore, my advice has been to spend money for phosphoric acid, then for nitrogen, and then afterwards, if there is any lack, for potash.

I have given this statement in order to show that you must be cautious in applying the experience of the East to this country. The trifling amount of potash that exists in Florida soil may well need replenishing. The immense amount of potash in California soil shows that the presumption is that in ordinary cases no such fertilization is called for.

As there is a decided difference in the *soils* of the humid and arid regions, we should expect naturally that there would be some difference also in the *fruit* grown; and I may say that the difference I have found in the analyses made by us of California fruits, and comparing them with the analyses made from the old country and from the East, fully bears out that expectation, and here again I may say that the work we have done on these fruits at the Experiment Station at Berkeley exceeds in amount the whole that has been done in Europe in that line, just as the soil analyses exceed the amount of all the similar work that has been done heretofore.

I remarked at first, in regard to this table, that the analyses having a red star represent results we have reached by our own investigations. The others are results we have taken partly from the East and Euro-

pean determinations, and we do not vouch for them, but I will give off hand, from my manuscript, some data in this regard.

First, let me state how many analyses the starred results represent: Of citrus fruits: oranges, 130; lemons, 45; total, 175 analyses of citrus fruit. Of stone fruits: prunes, 36; apricots, 14; plums, 3; nectarines, 1; total, 54. Olives, 26. I have not given the olive analyses here because they are not in the same form as this table. We have made analyses of 2,136 grapes and grape musts, and of 1,500 wines. I claim that such a series of analyses deserves very much more credit than half a dozen or a dozen, if made elsewhere, of the same fruit; and I claim from these analyses more authority than any European analyses can possibly give. It seems to me that in the compounding of fertilizers and in connection with orchard fertilization, our analyses should represent our fruit and not the analyses of Europe, no matter by what name they are backed.

I will give you a few data in regard to differences we have found. The important point covered, without reference to fertilizer, is the amount of sugar contained, the amount of acid, and then the amount of ingredients that represent their truly nourishing factors. You know that our own flesh is derived purely from the same ingredients contained in plant or animal food—if in animal food, meats, etc., it comes originally from plants or vegetable food consumed. There are certain of our foods that are supposed to be specially nourishing; for instance wheat, among the cereals, the highest of all; among the vegetables, beans and peas are esteemed most highly, because they contain the largest amount of those flesh-forming ingredients, or albuminoids, as we term them chemically. I will give some comparative figures in regard to the contents of the three chief groups—sugar, acids, albuminoids—in the California fruits.

We have in the apricot, 12 per cent of sugar, against an average of, at the most, 10 per cent in the European fruit. The usual content of the European fruit is 6 per cent, but for southern Europe alone we can make it up to 10. We therefore have more sugar in the apricot by far. The apricot of France, in particular, contains only 6 per cent of sugar, while ours has an average of about 12 per cent. In the California prunes we have 16 per cent of sugar against 6 per cent in the European prunes. That is a surprising result, which, however, I have verified; the large series of analyses we have made show definitely that our prunes contain so very much larger a proportion, nearly $2\frac{1}{2}$ to 1 as compared with the average of all the prune analyses we have been able to get together. Probably if we had the Italian prunes to make a perfectly positive comparison, the figures would have to be somewhat varied. These refer only to French prunes. We have brought together, as nearly as we can, all the analyses of the other countries.

MR. SPRAGUE: That is, the prunes in each case are similar in variety.

PROFESSOR HILGARD: Yes. In ordinary plums we have in California $13\frac{1}{2}$ per cent of sugar, against about 5 in Europe. As to plums and prunes, we have found prunes at Mr. Gillet's that contained over 20 per cent of sugar, which are more nearly like dates than any I have tasted. In grapes we have an average of 26 against $21\frac{1}{2}$. In peaches 13 against $4\frac{1}{2}$. In oranges, $7\frac{1}{8}$ against $4\frac{1}{8}$. Figs, 19 against $11\frac{1}{2}$.

Now, this is not surprising, because the European countries in which these fruits are produced are not arid but humid regions. Italy is not an arid country, and therefore the production of sugar is not so high. The south of France comes nearer to us in the production of sugar in

fruits. In almost all of these cases, when we compare, there is a corresponding excess of acid in the European fruits. In the European grape the average is about .8 per cent; our average is about .5 per cent.

The differences in the flesh-forming ingredients are still greater, and it is very remarkable that in nearly every case the California product is far ahead of anything that European fruits can show. Take the albuminoids in the apricot—we have a proportion of 5 per cent in the California against 2 in the European. It contains two and a half times more of flesh-forming, nourishing ingredients than the European. In the prunes, 5 to 4; in plums, 11 to 4; in figs, the difference is also somewhat in favor of the California product, but in the case of oranges, the difference is the other way; why, I do not know. But we have, in the case of oranges, as I have told you, a very large number of analyses; we have eighty, I think, all told; there can therefore be no question about the fact. It is a very much larger average than we can get from Europe.

I could go through this table showing the composition of the ashes of fruits, and show there are very wide differences in these also. Among them is, that the amount of potash in the California fruit is less than in the European and Eastern fruits by about 15 to 18 per cent. The California fruit contains that much less potash than does the European; although our soils are so rich in potash, our fruits draw less upon it on the average.

In phosphoric acid, the difference is very great; in some cases the difference is so great that I cannot help suspecting that there was some error in the European analyses. The amount of phosphoric acid required by the fig is large at best; in the analyses on record we find that California figs contain nine times more phosphoric acid than the European fig, but I must confess that the European fig analyses on record are not many, and as they are probably not very reliable, I doubt if such a difference exists. However, in the case of the orange, we find that the California orange contains 13 of phosphoric acid against 11 in the European. In the prunes, the difference is very great, .68 against .95.

You see, then, that alongside of the very small percentage of the phosphoric acid in our soils, some fruits draw more heavily upon them, for some reason, than in Europe. Our average is from such a large number of analyses that I cannot doubt the correctness of these facts.

In the matter of nitrogen, the third substance, which is by far the most expensive of replacement, the difference is frequently great. The California fruits all draw much more heavily. In the case of apricots, 60 to 25. Our apricots are more than twice as nourishing, so far as the European analyses show. In prunes, 50 per cent of nitrogen against 30 of the European. In oranges alone the difference is the other way; we have 37 in California against 54 in Europe.

I might continue and show more of these differences, but my object is not now to go into detail in the matter, but in the main to show you that these things require investigation, and that you must not take it for granted, because some distinguished man in Europe or in the East has made analyses and given a certain result, that you here in California can rely on that. You cannot do so. As I said before, the arid region has now for the first time come under examination as to the chemical composition of soils and products.

ROOT KNOT.

A lengthy discussion followed on root knot, and the means adopted for its arrest. The conclusions reached were that as yet the cause producing the knot is unknown. Professor Hilgard asked that the growers furnish him with specimens of root knots during the different months of the year for investigation.

Mr. Lelong reported having made extensive experiments to establish the fact of its being contagious or not. More than one thousand trees were inoculated with the knot at different periods of growth in all months of the year, and none took or distributed the disease to the trees. Many were budded and grafted with knots, but none took, proving that the disease is not contagious, at least in the stages when grafted and budded. He said it was possible there was a time during the period of growth when the disease would spread and be contagious, but that the particular time was not known. These were the first experiments conducted in this line, and others will follow.

ORCHARD FERTILIZATION.

By A. SCOTT CHAPMAN, of San Gabriel.

I will give you my experience on my ranch. It is situated about twelve miles east of here, on new granolithic sand. There is no bottom water. The analysis is about 1.14 per cent of potash, 2 per cent of lime, 0.16 per cent of phosphoric acid, and 0.01 per cent of sulphate of soda, a maximum crop of oranges being about one hundred boxes per acre; which would remove from the soil about 28 pounds of phosphoric acid, 10 pounds of sulphuric acid, and 63 pounds of nitrogen. When I took hold of this business I had plenty of water and I irrigated freely. The chaparral had never been cleared off. I cleared it off and found weeds, such as mullein—clover did not grow; alfalfa did not grow, except one species. I commenced fertilizing with sheep manure at the head of the irrigating ditches, and distributed it all over the orchard freely. The sheep manure was full of clover and alfalfa seed. These seeds did not grow. The following year I fertilized with phosphate made from bone black in San Francisco, treated with sulphuric acid, and an immediate change took place in the color of the clover which came up. I afterwards fertilized with bone-meal, supplying phosphoric acid and nitrogen. I found that to be a complete fertilizer for my soil, running as high as it does in potash, phosphoric acid, and nitrogen. My orchard was suffering from yellow scale. It has since died out by reason of the parasite. The white scale has affected the trees very much. The last crop I had was three hundred boxes, but when I saw the work of the *Vedalia cardinalis*, I put all my money into a carload of sulphate of ammonia in Cleveland, Ohio. I put this on my land, and during the summer my orchard turned green and took on a luxuriant color. The trees blossomed in the winter and were set with fruit, and I had over three hundred boxes the following year. Still my place did not have the appearance I wished it to assume. One day Dr. Woodbury came out to see me, and wanted to get some of my lemons to make oil of—the

oil of lemon—and citric acid also. I told him what I had done—the effect of the phosphoric acid—and he asked to make an experimental test on the part of the ranch that had not been fertilized. I made several experiments. We applied nitrate of soda, pure and simple. I obtained phosphoric acid, made from burned bones in San Francisco, treated with sulphuric acid, getting pure potash. Also, pearl ash dissolved in water; nitrate of soda and potash. One solution was phosphoric acid and nitrogen, and another was phosphoric acid and nitrogen and potash.

Now, if potash was not lacking in that soil, analyzing as high as it did, it would receive nitrogen and phosphoric acid. One soil receives the complete fertilizer, by which you will understand nitrogen, potash, and phosphoric acid. It looked beautiful. It was much superior to any other place in my county. I concluded that a little potash was absolutely necessary. I ordered from San Francisco a fertilizer which was 10 per cent potash, 10 per cent phosphoric acid, 3 per cent nitrogen. I applied that. My trees now have a healthy appearance and the place is looking extremely well. As I said this morning, I was able to pay the railroad over \$250 an acre in freight. I continue to grow clover and such weeds in order to have a supply of humus in my soil. I wish to maintain my orchard as though it was a nitrate bed. Nitric acid grows one part in 10,000. The leaf takes up all the carbon which enters into the combination of the plant, and 95 per cent of the plant, exclusive of its water, is carbon derived from the atmosphere.

Now, I have a small vineyard, composed of Flamy Tokay grapes and other grapes. The other grapes bear a little fruit—not very much—but we have been able to rely upon the Flamy Tokays for several years. This year I have a double crop. I applied last winter a fertilizer from a compost of cow manure, treated with muriatic potash, 200 pounds to the acre, also 75 pounds of sulphate of iron to the acre—an exceedingly large dose. Previous to this summer that orchard was full of black knot. I could break off pieces as big as my fist. This last summer I had no difficulty in disposing of the grapes. Every one told me they were the most beautiful Tokay grapes they ever saw. So much for a good fertilizer.

I have one more experiment to report. I had a small area of lemons. I put sulphur on the trees early in the morning when the trees were wet with fog. The sulphur adhered to the trees and there is not now any scale in the neighborhood. These trees have an exceedingly luxurious appearance, and I believe that sulphur will be a great thing for my orange orchard. I got the idea from a gentleman who experimented with sulphur to prevent the red spider. I have recently put the sulphur in a seed sower and driven through the row, with a perfect cloud of sulphur coming out from behind the wagon, and as I was ahead I was out of this cloud of sulphur. For several rows on each side, the sulphur extended, settling all over the trees. I quote that experiment thinking it may be of interest.

MR. BERRY: Mr. Chairman, I wish to say a few words in regard to the fertilization of fruit. The proposition suggested by Mr. Chapman, who has just spoken, is perhaps of great interest to citrus fruit growers, as well as to growers of deciduous fruits.

THE CHAIRMAN: There are two more papers to be given on the same subject; discussion will then follow.

FERTILIZATION IN RELATION TO IRRIGATION.

By PROF. S. M. WOODBRIDGE, of Los Angeles.

Plant growth may be likened to a circle. It takes three hundred and sixty degrees to make one. If one degree is missing you have no circle. And so it is with plants and their products. Of all the elements that go to make up plant life each is essential, and if only one of the least of these is missing, nothing will grow; as are, also, the conditions essential which must exist in order that chemical action—atomic motion—may be carried on. It becomes us, then, to consider these elements and the condition of their action. Let us contemplate for a few moments this wilderness of matter—this labyrinth of nature—and reduce it to units, for use on the ranch.

You may ransack the earth, you may search wheresoever you will, from the tops of the Himalayas and Andes to the very bottom and ooze of the sea; from the rugged coasts of Labrador to the diamond fields of South Africa; from Greenland's icy mountains to India's coral strand, and assuming that you have obtained samples of everything within the range, either in heaven above or on the earth beneath, or in the waters under the earth, and that all these innumerable number of samples had been reduced to their constituent elements, you would find that you had but sixty-five. Of these sixty-five elements, but thirty-five are what may be called common; the others are called rare, and seldom play any part in the affairs of man.

You may retrace your steps and make the circuit of the globe, looking only for organized forms of matter. You may examine these minutely in detail, from woman, that noblest work of God, to the merest protoplasm or microbe. You may examine all the foods of man and beast. You may enter the vegetable kingdom and examine it, from the coarse growth of the rank marshes reeking under a tropical sun, to the vegetation that lies buried for more than half its time 'neath snow and ice in the uncongenial clime of the far north. You may examine all the colors of the flora, from the deepest scarlet of the Jacqueminot to the more delicate shades of the exotics. You may examine all the odors that are the products of growth, from the sweet violet and the night-blooming cereus, to the rank garlic, the insidious tobacco, and the skunk cabbage. You may examine all the flavors from the dulcet of the orange, and the honey that lurks in the bud, to the heat of the cayenne pepper and the bitter of galls. And assuming that nothing within the range has escaped your notice, and that samples of all the products of growth had been gathered, and that all this innumerable number had been reduced to their constituent elements, you would find that you had but fifteen elements. One of these fifteen elements—namely, iodine—is distinctly a product of sea plant, therefore you, as land animals dealing only with land plants, have but fourteen elements to consider.

For the convenience of becoming acquainted with these fourteen elements, let us classify them. How much easier it is to remember and reproduce classified knowledge than it is a lot of isolated facts! Science is nothing but classified knowledge. The fourteen elements may be divided into three classes:

1. The air elements, or those that are derived by the plant solely from the air. They are carbon, hydrogen, and oxygen. These are always present and in sufficient quantities to maintain their part of plant life.

2. The soil elements, or those that are derived by the plant from the soil. They are potassium, sodium, calcium, magnesium, manganese, iron, sulphur, phosphorus, chlorine, and silicon.

3. The third class is composed of but one element, viz.: nitrogen, and I make a separate class of it, because it is derived by the plant from both the air and the soil.

It is, then, a combination of some or all of these fourteen elements that makes organic life, and this is built up by chemical action. Chemical action is atomic instinct, and atomic instinct implies atomic motion, and atomic motion is going on everywhere unceasingly, under the immutable laws of God.

There is in life everywhere a certain unrest, and this from the very mind of man to the simplest of the elements in the soil beneath your feet—a continual chemical action—atomic motion—a union and disunion, a marriage and divorce of the elements, in utter disregard of all moral laws.

Who has not marveled as he first beheld one of those majestic redwoods, towering three or four hundred feet above his fellows, and spanning, perhaps, many centuries of time? What is it, and whence came it? And, for that matter, what is all life, and whence came it? Beginning with a mere vitality, gathering to itself certain inorganic elements, putting them together in an organized form, flourishing for awhile, and then, what we choose to call life ceases to exist. Death! No. At that very moment another life begins. 'Tis the life of decomposition, disunion, divorce. It is chemical action—atomic motion—no less in power and strength than that which built up the first life. The air elements returning to the soil, whence they came, and the soil elements to mother earth, whence they came, who stands ever ready to receive her children within her bosom when they have run their little course, there to let them rest and recuperate before entering new forms and running a new course of vitality. Yes; the earth is the material mother of us all, and when their course is run all her children go home to her—dust to dust.

"Imperial Cæsar, dead and turned to clay,
Might stop a hole to keep the wind away.

Well, these eleven elements which the plant takes up from the soil are essentially plant foods, and of these there are, as a rule, only three that any soil is likely to become deficient in. They are nitrogen, phosphoric acid, and potash, and sooner or later they have to be returned to the soil. There are some other substances, such as the sulphates of iron and calcium, that may be profitably added under certain circumstances and on some soils, but I must not digress. This being so, there are but three expensive elements that can enter into a commercial fertilizer.

To recapitulate: There are but fourteen elements that enter into plant growth. Three of these are derived from the air and eleven from the soil, and of these eleven there are but three that soils are apt to become deficient in. That statement is simple enough. Let us avoid even the terms "complex" and "complicated" in connection therewith. Nature is always simple, direct, and positive in her ways, although man, in the confusion of his mind and in his desire to appear learned, is apt to be profuse in describing her methods. We want scientists as leaders who

will unravel what appears to be mysterious and complicated and give the results of their researches in plain, attractive, and concise language.

Having shown what are the elements that go to build up plant life, we will now take up the conditions under which they *are* built up—not including climate, however.

The great German chemist, Liebig, formulated the proposition that plant foods, in order to be available, must be soluble. This implies a menstruum, in which they are to be dissolved. Of course there is but one—*water*.

The relation, then, of irrigation, or water, to plant foods is important; for if on the one hand we do not get water enough, certainly there will be nothing to dissolve the plant foods, and under such circumstances chemical action—plant growth—cannot go on, as all Western men practically know by looking at arid lands in the dry season, and as all Eastern men know by looking at their good wife's house plants. On the contrary, if too much water is applied, so that it either soaks down below where the roots reach or drains off the land, the soluble plant food that is dissolved by such excess of water is either carried down below the roots or runs off the land, thus impoverishing the soil. Where too much water is applied it is a leaching process that is going on, not a filtering one.

I wish that this distinction would be borne in mind by all irrigators, and especially by those who own their own water. I have asked many of the latter class how much water they were applying, and with but one exception they have all answered that they did not know, generally adding "that it costs nothing." These gentlemen, as a rule, irrigate by the so-called "modern method," which consists in running the water down through furrows, claiming that it is the easiest and cheapest method. In more than one instance it has been said that so long as the water was put upon the ground, it made no difference how it got there. One might as well say that it made no difference in the meaning of a sentence how it is punctuated or expressed.

It behooves us, then, to look carefully at the proper application of water to the land. While we must be sure to get enough in order to maintain chemical action, we must be careful not to get too much, so as to leach out the soils and uselessly impoverish them.

It seems, then, that inasmuch as the roots of the trees in an orchard form a perfect network through the whole soil, it is necessary to get an even distribution of the required amount of water over the whole surface of the land. This, certainly, can be done by the basin method.

The so-called "modern method" should never be resorted to, except where it is absolutely necessary, and then the head ditches should be very near together, and the furrows small and numerous. I know that this method is very popular, easy, and cheap, and, what is more and worse, many people are in the habit of so irrigating. We are all creatures of habit, and what we are in the habit of doing is very hard to change.

The person who is in the habit of irrigating by the furrow method finds it very easy to turn the water on in the morning; get it regulated with close watching all day. At night he takes the last look, and finds it working well, goes home, and permits the laws of gravity to carry out the process while he sleeps, and awakes in the morning to find that these laws have not been suspended, and the water still running down hill. The specific objections to the system are:

First—As a general rule, anywhere from double to five times the amount of water is used at an irrigation that is used in the first and second methods above mentioned; and,

Second—That the water applied by the system is very unevenly distributed.

To illustrate: On a piece of heavy red soil, one hundred and eight feet long, the water was turned in the furrows and left to run for three hours. On the following day, digging revealed the fact that at the head ditch the water had penetrated fifty inches, and that at the distance of one hundred and eight feet it had not penetrated twelve inches.

How deep the water would have percolated at the flume, had it been left to run three days, and what amount of leaching might have been done, we can only conjecture by looking at the yellow and unhealthy condition of some of our older citrus orchards, and especially at the upper end of such orchards, that have been irrigated by this so-called modern method. There are two modifications of the system which are improvements. The first consists in piping the orchard, say every tenth row, so that the furrows are short. The second consists in running cross-furrows parallel with the flume, thus making temporary basins. Here, certainly, is food for reflection, and a subject to be investigated with profit.

The Directors of Agricultural Experiment Stations might give their attention to the subject, and determine the amount of water necessary for differing crops, on widely varying soils and in diversifying climates.

When we see a large excavation, great heaps of building materials, and enormous timbers, are we not justified in drawing the conclusion that a large edifice is to be erected? So, when we consider the vast extent of territory comprised within these United States, with its numerous rivers and harbors; its enormous resources of field, mine, and manufacture, brought together by a vast system of railroads; its borders filled by a thinking and progressive people, whose children are taught to read and write—are we not justified in drawing the conclusion that a great nation is to exist here? Aye! the greatest nation on the face of the earth! And where in all this fair land is there a more favored spot than this of California? It is better than if it were flowing with milk and honey.

You have a climate that is simply perfection. You are surrounded by scenes that are enchanting beyond description, and you have soils that are naturally rich, but you must maintain their integrity. You would not think to milk your cow for long without feeding her; wherefore would you think to crop your fields without feeding them? You cannot do it. With the integrity of your fields maintained and an economical utilization of the waste products of the ranch, and a continuance of the progress already manifest among you, future generations will think the poet a fanatic who could imagine, much less desire, a time "When earth should have commerce with the stars."

DISCUSSION ON GUM DISEASE.

CAPTAIN THOM: Have you ever thought that by the ancient system of irrigation, such as you have just described, the trees are very much more liable to the disease known as the gum disease?

PROFESSOR WOODBRIDGE: I have investigated that, so far as I have been able, and I find there is more gum disease where the furrow method is resorted to than there is where the basin method is adopted.

MR. SPRAGUE: What do you mean by gum disease?

PROFESSOR WOODBRIDGE: It seems to be a cracking in the bark and an exudation of the gum, which sooner or later runs down the tree and affects the bark underneath.

JUDGE HEATH: I believe a tree affected with gum disease should be burned up at once. I can go into portions of my orchard that I have watched closely for thirty years, and point out the spots where the different systems of irrigation have been tried. I do not think this disease can be indigenous to the soil.

MR. LELONG: I will give a little information about my experience with the disease. I have had about twenty-five years' experience. The trees I first treated were about forty years old. We tried to save those big trees, if it could possibly be done. We had to tie the trees, so that they would not fall over, and we found at that time that where the gum disease half-circled the tree the bark underneath was injured to such an extent that it had decayed and rotted. Then again, we found a great many instances where there was one little spot on the tree where the gum was oozing out. By cutting that away you would find a dark canal, and this gum disease would go there, and sometimes we would trace it to the top of a tree thirty feet high. The sap of a tree does not go, as many suppose, all around and up, but it goes up on the side and through these cavities on the tree, and it seems to me that wherever the disease entered into the sap of that tree, it would take it up through the entire tree. We tried this experiment, which was very costly, and after about five years' experimenting with these old trees, it was finally concluded the best remedy was to take them up and burn them. No tree was cared for, excepting when the disease had just started, and then, if it was cut out and left alone for a few days, and then gouged out some more, until we had the whole of the disease taken out of it, it would break out of the other side. It was my experience that it went to the root as well as to the top of the tree.

JUDGE HEATH: You stated the roots of the trees, the tree being girdled, sometimes there would be only one root left. That was an orange root, was it?

MR. LELONG: Yes, sir.

JUDGE HEATH: Is it not a fact that you can take an orange tree and girdle it entirely, and save the tree?

MR. LELONG: I have had no experience in that way, and I have been very much surprised at a tree, which was entirely girdled, in which I noticed last spring new bark and leaves coming out, and I think the tree is going to be saved.

JUDGE HEATH: I have seen trees completely girdled by gophers. I had an orange orchard adjoining my lemon orchard, and the gophers on my place were very bad until I have been able to kill them off entirely. The gophers did not trouble my lemon orchard. I have never lost a lemon tree, and the trees are twenty-seven years old. But the gophers were so bad that they girdled my orange trees, sometimes as much as six inches wide, and yet my trees lived and are living and bearing fruit to-day.

MR. LELONG: When the gophers took this bark off, did they eat into the wood and disturb the inner layer, which becomes new bark?

JUDGE HEATH: Just simply left the wood of the tree. I refer to that simply to get at this gum disease in the lemon. If you girdle the lemon tree, there is nothing in the world that will save it. The orange tree appears to be the exception in our fruit trees. Of course, the gopher in eating simply eats the bark and does not disturb very much of the wood. Now, I happen to have one lemon tree in my old orchard which has the gum disease. I know how that gum disease occurred. It occurred by a careless fellow plowing and abrasing it with the plow. Those trees are on a lemon root. That is the only tree I have that is diseased in that way.

MR. SPRAGUE: How did you kill your gophers?

JUDGE HEATH: I bought strychnine and used it on vegetation. I hired men to go around and put the strychnine in small pieces in every hole. That did not eradicate the gophers on my place. There were a great many of them, and they were constantly doing me a great deal of damage. I had a great many cats, but the cats could not get away with the gophers. I bought a lot of traps, and hired men and gave them 5 cents apiece for every gopher, and to-day my place is as clear of gophers as any place in California.

Now, with regard to this gum disease; I have been experimenting considerably on that tree. The tree bears a great deal of fruit. Of course, when you check the growth of the tree in that way, either by root pruning, or otherwise, you force the strength of that tree into the fruit. All you gentlemen having orchards have observed that if you have a tree that is bearing no fruit, and has borne no fruit for several years, you can force that fruit by cutting some of the lemon roots. Now, if you affected the tree otherwise, you might force that tree into bearing fruit. This gum disease has forced the fruit of this tree. It is a large tree and bears a large amount of fruit. I commenced experimenting on that tree, cutting the bark carefully, and found the wood under the affected part to be dead. By dead, I do not mean to say that it is rotten. It is as hard as bone, and no sap could flow through the pores of the wood or be affected by it, and could not go up or down in the grains of that wood. It is hard, dry stuff. But if the disease were to follow down, it would run into the ground. Now, I agree with Mr. Lelong exactly. It is my opinion that the disease in that tree of mine, instead of going down, does absolutely go up on the bark. The tree is almost dead, although half of the bark on that tree is alive; yet, by taking the point of my knife and running in on the side of the bark, where it is apparently green and lively, where the sap would flow and new wood form, there is a yellow substance which appears to be fresh bark. I am satisfied the tree never could thrive, and I am satisfied, with all I have tried, and I have tried everything, that the rot will kill that tree, and nothing under heaven can save it.

PROFESSOR WOODBRIDGE: May I ask a question about these orange trees that have been girdled? Have they not their own roots above the girdled part, so as to keep them alive and get into the soil?

JUDGE HEATH: Years ago, when some of the older people here can remember the old round-house in Los Angeles, they will remember a gentleman who had some orange trees, and the tops were cut off and the trees transplanted, and some of them were injured. I happened to be here, and observing those things, knowing the gentleman, and seeing that some of those trees were injured pretty badly by having the bark

off—my oranges had been planted and had been girdled by gophers. Now, the gopher had come out of the ground and girdled the tree from an inch above the ground to six or seven inches high, and before I had observed it a number of the trees were completely girdled above the ground. When I did see this, I cut the tops off, just the same as I would if going to transplant a large tree. I put nothing on the trees, but I left them there. The soil was sufficiently moist, or if it needed water I irrigated them, and gave them plenty of water. Gradually the tree healed, but not from the bottom. The bark grew from the upper part where the tree was girdled, and continued to grow down until it united with the bark next to the ground. That thing occurred in more than twenty instances, and the trees are alive and bearing to-day.

PROFESSOR WOODBRIDGE: I ask Captain Thom. How long since you first applied carbolic acid to your trees?

CAPTAIN THOM: I have applied it for the last three or four years. I have found out, in the orchard of which you have spoken just now, that when I cut it out on the one side, it breaks out on the other, and in my opinion the orchard containing ten or fifteen trees had better be taken out. I do not believe there is any remedy. I have been attending to these trees assiduously for three or four years, and I have applied all sorts of things to them. I have attempted to remove every vestige of the disease. This disease in many cases extends to the roots. The roots are absolutely rotten, not hard, but decayed, and in experimenting above with the knife I found that the tree indicated the possibility of a recovery. The next season, the disease makes its appearance somewhere else, either on one side or the other. They bear. They are the most inveterate bearers I ever saw. They are full of fruit to-day. I think it is a matter worthy of the strictest attention of the horticultural people of this part of the State.

CLAIM OF YOUNG & POWERS.

MR. ADAMS: Mr. President, I take this opportunity to introduce a resolution, which I have been requested to prepare, as expressing the sense of the convention, so far as we can judge, in regard to the money matter which came up this morning. We desire that immediate action be taken upon it.

Resolved, That this convention, representing more directly than any other body the horticultural interest of California, acknowledges the indebtedness of that interest for money honestly and necessarily expended in its behalf, in promoting legislation for the protection of our orchards from predaceous insects; that the money is due for professional services and for expenses in drafting the bill and repeatedly arguing the same before legislative committees in our behalf; that the value of the services is proven from the fact that the law enacted in our interest was promptly decided in the Courts and sustained by them, thus providing us for the first time with a local means of protecting the industry from the consequences of neglect and indifference on the part of absent owners of fruit orchards; that certain persons, acting in our interest and at our request, have been personally sued; that the sum due, and for which our representatives have been sued, is \$600, which is a compromise amount for which these claims can be settled; that Mr. Lelong be, and he is hereby appointed, a committee of one to collect from the fruit growers the sum above stated to be due.

Adopted.

A recess was then taken till 7:30 P. M.

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XXVI.

EVENING SESSION.

Vice-President KINNEY in the chair.

IRRIGATION.

By JAMES BOYD, of Riverside.

That the subject of irrigation is of world-wide importance we have only to look back a month or so ago to the International Irrigation Congress and look at the list of delegates from all parts of the world. The Orient and the Occident, the Northern and Southern Hemispheres, all the leading divisions of the globe were represented, and all manifested a lively interest in the proceedings. Although this unusual interest is of modern date, we cannot by any means suppose that irrigation is a new idea. Almost all of the civilized races of the past of which we have any record practiced irrigation, and there are some races of which we have no record, notably on our own continent, that have left no traces of their history outside of the remains of their irrigating canals. Under the ancient civilizations the necessity of irrigation will be apparent when we consider that under their comparatively rude form of agriculture, with their meager mechanical appliances for tilling the soil and for gathering their crops, and when we consider further the barbarous nature of most of the people surrounding these civilizations, and the dangers they were in from the outlying savage races, it is not to be wondered at that as people became civilized they clustered together for mutual protection as well as for the enjoyments of society. Hence, the necessities of the situation demanded that the soil should be drawn on to its utmost capacity; and under the semi-tropic climate, where most of these civilizations existed, by a proper system of irrigation the soil could be made to yield its rewards all the year round. With the limited means of transportation, one country could hardly be drawn upon to supply a scarcity in another, hence irrigation, with its certain increased production under intelligent management, could be depended upon to avert most natural shortcomings or calamities from failure of crops.

Whether the ancients were troubled with the problems of transportation or middlemen or false plans of distribution cunningly devised to rob the producer, we are as yet in ignorance, but as much of the manual labor was in all probability slave labor, their troubles undoubtedly assumed a different form from what they do in our day and generation. Whether fruit raising in ancient times bore any such relative importance to grain raising as it has assumed in modern times history at best is very doubtful, and we can only judge from the few fragments that have been handed down to us that it did not, hence we are reasonably safe in saying that it did not, and if the surmise is correct we can again safely say that as a race we have taken some steps in advance of the historic or prehistoric past. As a rule, our arid regions are situated in the southern part of the temperate zone, where the climate is mild and healthy. The founders of this republic settled in the naturally rich and well-watered plans farther north, where the climate is oftentimes severe and unhealthy and where also a growing civilization renders the denizens

more susceptible to unfavorable conditions, compelling much indoor life for a large portion of the year, in this way favoring a tendency to poor health and abridging much of the pleasures of life and even life itself. Man also is formed for society, and the progress of the race can best go on by constant social intercourse. A time, however often, comes to man wherein he loses much of the pleasure of social intercourse by reason of ill health, and then the world is ransacked in search of a place in which to regain health and enjoy life. To the man of wealth this is comparatively an easy matter, but to the poor or those of limited means until of late years almost an impossibility. It has been known as long as our country has been known that our arid lands presented the best climate that any person in search of health could desire, but the problem was how best to utilize it for those who had to make their living as they went along. That problem has been solved by the one word, irrigation.

Colorado and California present two of the best and most successful examples of irrigation development on economic and hygienic lines so far, and had it not been for good hygienic reasons our irrigation development under our modern system of irrigation might still have been in an embryotic condition. And while the writer speaks of irrigation in this connection—he has not the smallest intention of detracting from other parts of our country, which are equally as health-promoting as this, or saying that other places, which do not make a specialty of healthfulness, cannot make a success of irrigation—the broad assertion cannot be denied that a health-giving climate, in which outdoor vocations could be carried on every day in the year, has been the greatest factor in hastening the spread of irrigating waters over our fertile State. Take Riverside as a type, because she was the first in point of time, and her first settlers were more or less invalids and health-seekers fleeing from the rigors of Eastern winters. Is it any wonder, then, that on regaining their health and finding a genial climate they gave themselves, heart and soul, to the development of this part of our country. And as that could not be done without water, water development has been almost a mania with them, and Riversiders have taken a large hand in developments elsewhere.

It has always been a custom with every nation that they should take with them, whenever they migrated, their household gods, their *Lares*, *Manes*, and *Penates*—and our modern wanderer takes his too, but in the form of all the accessories of our latter-day civilization. In our day we are not content unless we can make our cities, like Jonah's gourd, almost spring up in a night. Our churches and our schools, our newspapers and our public libraries, our high schools and our colleges, with all the concomitants of railroads and telephones, driveways and boulevards bordered with fountains and shade trees, green lawns and fragrant flowers, and all that goes to make life a pleasure and to remind us what paradise ought to be, spring up under the heels of our pioneers. But these things are hardly possible, except under a densely populated country, and these we can secure under a judicious system of irrigation. While our sons and daughters have been leaving the farms, with the loneliness and isolation of the past, and flocking to our cities, with their supposed social and other advantages, some of our citizens have been trying to combine all the best features of both, and this, it is found, can be best accomplished where the climate is mild and dry and water is

plentiful for irrigation, and now the current is going to be reversed, for it is being found that our cities, under modern conditions, are not so favorable to the growth of what is best in intelligence and morality as is the modern colony in the country, where the productions of the soil, such as fruit, demand manual labor combined with intelligence.

In a meeting of horticulturists the subject of irrigation could hardly be treated of without some allusions to fruit growers in connection therewith, and although it is not the purpose of the writer to decry the culture of fruit without irrigation, or to in anyway undervalue any of the results, it may be permissible to say that but for irrigation much of our best fruit lands necessarily would be still a desert waste, and some of the special productions of the irrigated regions would be almost unknown in the great markets of the East.

Whether the home-seeker shall buy land where the rainfall is sufficiently abundant to raise crops every year without irrigation, or whether he shall take the drier lands and climate where water is abundant, each must choose for himself. There is a faculty in the human mind that is inclined to make the best of everything, and so whether a man buys land with water or without he will be generally inclined to assert that his individual choice has been the best.

Northern California and Southern California may be taken to be representative of the two systems, and we of the south keep pace with you of the north. Our main crop comes in at a time when you have but little to ship, and so when you get through with your shipping season you send down your idle fruit cars and we fill them with our golden fruits, and it so happens that in this way there is a constant stream of fruit crossing the continent to supply the necessities of those who are engaged in other branches of industry, and it looks now as if the development of our products by means of irrigation had just begun, for, not to speak of the undeveloped resources of our irrigable lands in our fruit-raising districts in Southern California, Southeastern California and Arizona have as yet but begun to ask the people of other States to come in and help them occupy the lands that were occupied thousands of years ago by prehistoric irrigating races.

What our railroads have made possible in the settlement of our vast inland domain, by bringing it within the reach of settlers, will have to be largely supplemented by irrigation. Much of the products of our irrigated lands must necessarily be grown for outside markets, for under our modern system of internal commerce, made possible and necessary by railway communication, each section of our common country is largely devoting itself to its own specialties and depending on other sections for what can be produced elsewhere more economically.

Our irrigated regions will always be celebrated for the production of the finer qualities of fruit, both fresh and dried. The drier the climate and the more bountiful the sunshine, the better the quality of the fruit and the better are the crude juices transformed into the health-giving elements that are often found necessary in moister climates, so that it may be said that in shipping fruit from our sunny climate we are shipping concentrated sunshine to cheer those who are less fortunately situated. As irrigation necessarily prevents monopoly of the soil to any large extent, compelling small holdings, as being more economical, so in like manner the products of an irrigated region preclude the use of machinery on any very extended scale, hence manual labor will always

be in great demand—not slave labor by any means, but labor in which intelligence shall be the foundation. It being granted that small holdings are a necessity in irrigated sections, and that labor-saving machinery can be used in but a very limited degree, we can never expect to see the cultivators of our lands degenerate to mere machines or automats, as every operation in connection with the soil and its productions requires the exercise of skill and judgment, and will necessarily look for a high degree of intelligence in the owner and occupier of the arid regions of our country that are going to be irrigated in the future. And we may look for a dense population and a higher degree of intelligence than has been counted necessary in the past, and the signs of the times justify us in saying that our now arid lands that are susceptible of irrigation will be the seat of a higher civilization than any that has heretofore existed on this continent.

REPORT OF COMMITTEE ON RESOLUTIONS.

MR. GRIFFITH: The Committee on Resolutions had the pleasure of acting on the resolution introduced by Mr. Snow. Four out of five of that committee are unanimous for its adoption.

Mr. Griffith then read the following resolution offered by Mr. S. K. Snow, of Tustin:

RESOLUTION OF CONFIDENCE.

WHEREAS, A studied and unwarranted attack has lately been made upon the State Board of Horticulture, and particularly upon its President and Secretary, by certain persons, who, by correspondence and otherwise, seek to create the impression that the fruit growers of one section of the State are inimical to the Board and its officers; now, therefore, be it

Resolved, That this convention of fruit growers deplores the effort made to disturb the harmony which has heretofore existed between the Board and the fruit growers, and between the different sections of the State. That this convention emphatically denies that any antagonism exists between the Board and the fruit growers of this State, or any section thereof; but, on the contrary, declares its entire confidence in the integrity of the members of the Board, in their knowledge of horticulture, and in the impartiality with which they have discharged onerous duties. That this convention sincerely commends the Board, and especially the President and Secretary, for the untiring zeal displayed by them in fostering every interest of horticulture confided to their care, and that for the successful introduction of various parasitic insects into the State they deserve the lasting gratitude of the people of the State.

To the State Fruit Growers' Convention:

The Committee on Resolutions respectfully beg leave to report that they have considered the above and recommend its adoption, as offered by Mr. Snow. (Signed:) G. J. Griffith, Chairman; Henry A. Brainard, A. S. Chapman, J. J. Pratt, Committee on Resolutions.

On motion of MR. MASLIN, duly seconded, the resolution was unanimously adopted.

THE CHAIRMAN: There is another resolution affecting the Nicaragua Canal. Mr. Berwick is the author of it.

The Secretary then read the following resolution:

RESOLUTION INDORSING THE NICARAGUA CANAL.

Resolved, That this convention, composed of California horticulturists, consider that the interests of the whole Pacific Coast, and of the entire American nation, demand the immediate construction, by the United States Government, of the Nicaragua Canal.

Adopted.

THE CHAIRMAN: There is another resolution, also introduced by Mr. Berwick, on the nationalization of railroads.

RESOLUTION ON RAILROAD NATIONALIZATION.

Resolved, This California State Convention of Horticulturists, assembled at Los Angeles this 23d day of November, 1893, believes that the best interests of California horticulturists and of the American nation demand the nationalization of railroads.

MR. SPRAGUE: I move the resolution be adopted.

MR. FOWLER, of Fresno: Mr. Chairman, if we value human life at all, we must take another view of this question. In 1890 or in 1891, I will not be sure, there was only one killed or wounded for every twenty-four thousand that were carried—that was in France. In England, one to twenty-one thousand; Germany, one to nine thousand; in the United States, one to twenty-eight thousand, and this under private ownership. If we had the government ownership of railroads, we would have another benefit—an educational benefit—because we would have cheaper transportation for our fruits—cheaper for ourselves as well as for our fruits—from one side of the continent to the other, and the opportunity of going there and getting that education that comes from travel and association. You here in California send circulars abroad, and spend money to get people from the East to come here and enjoy the climate, buy your lands, your products, and then shall we here in Southern California say that we do not want nationalization of railroads, which would bring more people to our coast, give them larger opportunities to come?

MR. SPRAGUE: I should be very glad for this convention to make it a special order for the next session, to take it up for an indefinite time, perhaps one hour and a half, for discussion. I think such discussions are in every way desirable, but of course there is a fitness of time, and I take it we cannot do anything further with it to-night. I now desire to amend my motion by making it a special order of business for the next Convention of Horticulturists, and that the particular time be left to the Committee on Arrangements.

The motion was adopted.

FOREST CONSERVATION.

By HON. ABBOT KINNEY, of Lamanda Park.

The importance of conservative forest policy is nowhere greater than in California.

It is now fully established, by the forest experience of France, Germany, India, Australia, etc., that judicious management will give a high and perpetual product of bark, fuel, tar, timber, etc., from the forest without injury to the forest reserve.

As great as is the value of a perennial and secure source of forest products, and as much as we may esteem the forest from a sportsman's side or regard it from the sentimental or sanitary view, it is all as nothing to its influence on the delivery of the rainfall from a country's watersheds. A forested watershed will deliver a given rainfall regularly and slowly over a long period as compared to the delivery of the same rainfall from the watershed deforested. The trees, roots, and humus detain and divide the rainfall, so that the water has time to be absorbed into the soil and rock veins. Thus, in a forested district there are none of the barrancas and gullies general in a bare country. In California we have gullies and washes in the southern section, with little forest and

small rainfall, while at Mount Shasta, with 60 to 90 inches of rainfall and a mountainous forest, these land scars are particularly absent. On a bare mountain watershed there is little opportunity for the rain to be absorbed, or for it to replenish the springs and sources of perennial water supply. Consequently the rainfall from such a district is delivered suddenly and in a short time, and we have dangerous and destructive floods. If a watershed is without forest the delivery of its rainfall is uncertain and injurious.

We are quite safe in saying that in California, as the mountains are deforested so will the perennial character of the springs and streams diminish or be lost, while on the other hand floods and torrents will increase in force and destructiveness. The water flowing regularly from the forested mountain is the aid and servant of man in his mill, house, or field. The water tearing madly over the denuded rocks of a bare and arid declivity is his scourge and his destroyer.

In the first report of the extinct Board of Forestry, a number of domestic and foreign instances are collected showing the damaging effect of undue forest denudation. Our brush of chaparral acts as a forest in delaying the delivery of the rainfall.

Some time before the abolition of the State Board of Forestry the friends of forestry in California concentrated their efforts on a national system of forestry. Colorado has gone hand in hand with us in this work, and participated in the results attained. We have achieved something important. We have secured the adoption of a policy of making forest reserves. The Federal Government has reserved large districts of land on the western mountain watersheds for the first time for forestry purposes, and called them forestry reserves. California and Colorado have been most favored in this way. In California south of Merced the most important mountain watersheds are now Government forest reserves. The Government has also taken the first step in recognizing its duty of protecting the public forest domain. The Yellowstone Reservation and the Yosemite, with its large addition, are now efficiently and cheaply guarded by small detachments of cavalry. The result of these patrols in preventing forest fires has been very marked, and has demonstrated that these wasteful and destructive forest fires were mainly due to irresponsible shepherders. The exclusion of these herders from the Yosemite addition ended the danger from fire.

These matters all promise well for the gradual establishment of a self-sustaining, scientific forestry system for the United States. Nowhere is a conservative system of forest management more important than in a country of steep mountains alternating with fertile plains. When to this condition is added that of alternating dry and rainy seasons, under which irrigation becomes an important agency in agriculture, we have paramount reasons for a forestry system.

We may say, in a general way, that the more difficult it is to create or maintain forests on mountain watersheds, the more important these become to preserve the perennial flow of springs and streams, and to diminish or prevent floods and torrents.

The blue gum is still the most valuable addition to the forest flora of California. We have indeed demonstrated the superiority of *Eucalyptus robusta* in situations exposed to the sea influence on the one side, and the superiority of the *Eucalyptus corynocalyx* (sugar gum) in resisting drought on the other; but the blue gum is still king. Of rapid growth,

available in most of the settled districts of Southern California, quickly available for firewood, and eventually, in favorable situations, valuable as lumber, it is the tree giving the promptest results of any known in the State. It comes easily from the seed and gives the best results when planted small, and is therefore a cheap tree for forest planting. When some plantations of blue gums are made in favorable locations, say in a burned-over redwood district, or in any damp location on the Central California coast, we may expect to get trees similar in grandeur to those of Tasmania, where the blue gum often exceeds four hundred feet in height. It is not generally known that the blue gum is a close competitor for the glory of being the tallest known tree.

The introduction of insect pests, while introducing foreign plants, has been the cause of damage and injury to the State. Often this damage has far exceeded any possible benefit to be hoped for from the plant introduced. To obviate this let me suggest the advantage of adopting the policy from which I never departed in introducing foreign plants to this State; that, is by the seeds alone. I have no knowledge of any insect whatever as ever following the distribution of forest trees grown from our examined seed. Such a policy would make little difference in time, and result in much added security, not only as to forest trees, but apply to all other plants. I am decidedly opposed to the importation of nursery stock from any infected district, and I believe that every foreign district producing nursery stock should be deemed infected until proved otherwise.

The importance of forestry is a thing no Californian can afford to lose sight of. Every city, village, home, orchard, and field in Southern California is subject to damage or destruction by unwise forest denudation. Such destruction may come through diminished summer water supply, or by excessive flood delivery of water, or the creation of new torrents, as has already taken place in our section. With all our mountains bare, there is no place here that would be safe. Let us join, then, in advising our federal representatives on this vital matter.

DISCUSSION ON FOREST CONSERVATION.

PROFESSOR HILGARD: Mr. Chairman, I have tried hard, both in the Legislature and elsewhere, to have considered the importance of a forest policy. Of course it is of slow growth. The American citizen knows no dearer privilege than to cut down a tree, and it is very singular, indeed, that in many districts we almost always find they are the first people to cut down a tree and then complain of the others. In regard to the trees to be planted, we have experimented already. I want to suggest one before this convention, because I do not think it is sufficiently appreciated. The eucalyptus is a fast-growing tree, but when it comes to the utilization of the wood, the fast-growing gum is a miserable failure. It is fit for firewood only, and that when cut green. I wish to urge the claims of a forest tree which in the last twelve years I have developed in this State, both by seeds and by young plants grown at the University. It is the European oak. Strange to say, the European oak is the fastest grower of its kind in our climate. One would suppose that coming from a humid climate that the tree would be shy of ours. I find, on the con-

trary, of forty kinds of oaks we have tried, that it is the only one which grows fast enough to suit our American ideas. It is the only hardwood tree that at the present time has proved to be a rapid grower in California. I think it deserves more attention than has been given to it, and I intend to propagate it extensively and to show what now can be seen on many of the private premises on the bay shores, and also in the interior: that this tree is a wonderfully rapid grower for an oak, and that it has a superior wood for constructive purposes such as we have not on this coast at the present time. It is the English oak. We have propagated it from acorns, and find no difficulty in making it grow. We find it must be planted in the spring, and in the course of the month of December it will come up and grow rapidly to about six inches, and then the top stops completely and you think that it is doing nothing. At the end of the season, however, you find it has made a root four feet long, deep down straight into the ground. I have made inquiry in Europe in regard to this peculiarity of the tree, and find that there also it does the same thing, but not to the same extent. It is noted as a tree having a long, deep root, and the proportion of six inches to four feet is a common one in California, which shows how wonderfully well it is adapted to this climate. I have now growing on top of an arid adobe hill, above the University, a number of these trees, planted partly from the acorn and partly transplanted. The trees which have been growing are about twice as high as those that have the top cut off on account of the transplanting, and the result is that one is growing straight up and forming extended trunks, which we cut off for general purposes, while the others are trying to spread out. I recommend this tree for general propagation.

MR. MASLIN: Is this English oak the same as the historic oak of England?

PROFESSOR HILGARD: Yes, sir; there are two species of oak in England—one the upland oak, sometimes called rock oak, the other the lowland oak. It is the lowland oak I speak of.

MR. MASLIN: I would like to ask if you have tried the American pecan?

PROFESSOR HILGARD: Yes, sir; the American pecan in this climate makes a better growth than the hickory. The hickory is absolutely worthless. I have tried hickory, and none of them have made a wood worth anything. The pecan is more disposed to grow slender, for some reason.

MR. MASLIN: Does it adapt itself to our climate and country?

PROFESSOR HILGARD: It seems to, yes. I will say that the pecan, being a native of the moistest climate in the United States, does not appear to be well adapted to an arid region. It belongs to the moistest and most humid portions of the United States—as you are aware, the bottoms of the Mississippi and the swamp regions of Louisiana. There is scarcely a tree imported from there, except the swamp cypress, and it is one of the most singular facts that we can grow the cypress from the Louisiana swamps on our land without irrigation. We have several growing from seedlings, and it makes a pretty fair and fast-growing tree; but I would hardly recommend it for general culture on this coast. This oak would be a tree which we may rely on to make hardwood for hoe handles, etc. We have not a tree now on the Pacific Coast which will make staves. The rapid-growing tree is necessarily a tree that has that spongy wood.

We must have patience if we want to get hardwood; we cannot raise that in a hurry.

MR. MASLIN: In the San Joaquin Valley, and in Lake County, these trees grow sometimes fifty or sixty feet to the first branch. It is a tall oak in Lake County. They claim it is a species all by itself. They are sometimes from forty to fifty or sixty feet to the first branch. They have made casks out of them up there, but that is too far off to be profitable.

PROFESSOR HILGARD: All the American species of oak, including the white, are exceedingly slow of growth. Some of our oaks make very good wood. I suppose if some of the mountain oaks were properly treated by a forester, they would make a good wood, but taking all experience together, I think the European oak is the tree upon which we can look particularly for rapid growth. There is a tree now on my premises, which is nine years old and is twenty-five feet high and ten inches in diameter.

THE PECAN NUT.

MR. DETRICK: Professor Hilgard, have you ever noticed the growth of the pecan in the Missouri Valley?

PROFESSOR HILGARD: In the Mississippi Valley I have, not in the Missouri Valley.

MR. DETRICK: Well, in the Missouri Valley I have seen trees apparently about seven or eight years old that were bearing nuts. Did you ever know anything about that?

PROFESSOR HILGARD: Yes; I have known that in that country; but in the Louisiana region, I know trees there in the oak region, which is considered the crack region of Louisiana, trees seven years old are expected to bear and they grow very tall. The bearing pecan tree is not a good tree to cut down. The wood is not as valuable as that of other hickories. The pecan is a hickory. It does not make a good wood; it splits easily.

MR. PARK, of Orange: Mr. Chairman, there has been some discussion about the pecan. I wish to state that we have two pecan trees at Orange that have borne for the last two years. They stand side by side by the roadway, and they have grown across. I have seen them for two years past. They have borne a very good crop of pecans. They have not made a very big growth. They stand about thirty-five feet high, and measure about eighteen inches in thickness through the main part of the tree.

MR. LELONG: Are those trees grafted or seedlings?

MR. PARK: I think they are seedling trees, from a place about a mile from Orange. I think the seeds were taken from there and planted.

MR. LELONG: The reason I ask this question is I have investigated the nut-growing trees of the State for the last two years and have found different trees planted throughout the State grown from seeds. There are a number on Mr. Chapman's place, in San Gabriel, and some in Merced County. It is well to note these facts, because there is likely to be a pecan nut so produced especially adapted to this State, and we are likely to strike something exceedingly good that will bear as the almonds do now.

MR. WILLIAMS, of San Diego: I want to ask if there has been any dif-

ficulty found, or if there has been any complete efforts made, to propagate the pecan of Texas. The finest pecans known in the world are produced on the Guadalupe River in Texas, below San Antonio, and they are sold as high as \$1 a pound in the State of California when they are introduced here, and I was curious to know whether these trees would succeed here inland. It has occurred to me that there are locations here which might be very well adapted to the pecan as grown in Texas, although there may be a surplus of alkali in the soil. They grow there with the roots submerged for three or four months in water. The nuts are certainly equal to any English walnut, and, I believe, superior to it as a commercial nut. I believe, as Mr. Lelong says, that if we could find something suited to this coast, just as they have the pecan in Southern Texas, we will introduce something that, I believe, will be a dangerous competitor to the English walnut or any other nut that I have seen.

MR. DETRICK: I would like Judge Heath to tell what he knows about the pecan. I hope you will listen to him for a little, for I believe he knows more about this than anybody, and he might give us some good ideas.

JUDGE HEATH: Mr. Chairman, I have had a lot of experience in pecans. Nineteen years ago I got a seed from Texas from the location the gentleman indicates as being the most favorable to the pecan family that we knew anything of at that time. I have the trees bearing now, but slightly. They blossomed only when they were fifteen or sixteen years old. On my lands, in my walnut orchards, I have these pecans growing. The largest trees are of the height of perhaps forty feet, branching out well. I was considerably disappointed in the growth of the pecan, and especially the bearing quality. Being in the nut business, I was anxious to get other nuts, besides the English walnut, that I might make profitable and sell in the market. So, nineteen years ago I commenced that industry, and got my seeds from Texas. But it has not proved a success. Eight years ago I went to the New Orleans Exposition. I went by the southern route and stopped off at San Antonio, Texas, and examined the country. I examined the locations where the pecan grows, and my conclusions are that it is not going to do on our good farming lands; it is not going to do on the lands here in California where the English walnut thrives. I have had nineteen years' experience, and as a nut-bearing tree this is a failure. Wherever you find the pecan, it is on the river bottom next to the water, where it stands with its roots in the water. It is both in Texas and Louisiana, along the banks of the Mississippi and the Missouri Rivers. You will never find any of these trees prospering, except close alongside of the river bottom, or where the river overflows the bottom land. There they will grow luxuriously.

Now, I have been asked since I have been in Los Angeles this time, in regard to the growth of the pecan, whether they can be grown profitably for the wood. I do not think they will ever be profitable as nut-bearing trees, for the reason that the pecan does not drop its fruit. In Texas and Louisiana and along the Mississippi River bottoms, the trees are cut down or the nuts beaten off by negroes or the poor whites, and the nuts are collected in that way.

Now, the location of my farm is as free from wind as almost any location in this State. We have occasionally a little wind, but it seldom does any damage. Last winter I had one of the tops of my pecan trees,

eight inches in diameter, broken square off by a wind that did not hurt either the English walnut or the almond trees standing within one hundred feet of it. My almond trees were loaded down with fruit. So, in its young state of nineteen years old, that tree is very brittle. I have about fifty of those trees, and that tree was nineteen years old. If it can be grown profitably for wood, when it has become old enough to be hard it would be very good, but it must be planted on lines of rivers like the Sacramento, where the taproot can be constantly in the water. In Texas and Louisiana the tree stands where the water stands over it for three or four or five months in the year. No tree grows more luxuriantly under these circumstances than the oak. I found in Florida and Louisiana that the water oak grows under the same circumstances, the same as the sycamore. If I lived on the Sacramento River, up at Yolo, or up in that section of the country, where the debris would not cover up your orchards, I would run the risk of planting the pecan tree, because I do not believe it would be injured by any overflow of the Sacramento—if it is not overflowed by slickens. Of course, slickens would kill that tree, because it would deprive it of its natural moisture, and also because there is no nourishment in the debris. It might grow on some part of the San Joaquin, down below Stockton, on what we call branch rivers, on the bottoms, close in and on the soil of the adjoining land, which is overflowed at times. Here the pecan may become valuable, but you must wait a series of years before you can get the tree old enough for the wood to be of much consequence. Now, as to the pecan on the arid plains of the Sacramento or San Joaquin Rivers, between Sacramento and Stockton, and on the lands there that are what we call highlands, because they are not subject to overflow, I do not think the tree would grow at all. I think it would be of no real value, except on the river bottoms.

QUESTION: Have you ever seen the tree tried in the salt marsh, near the coast, where it would get a good deal of the saline substance?

JUDGE HEATH: I can only tell what I have observed in my travels through New Orleans. I found the pecan tree growing down in a place where the water was an overflow from the high tide. It was brackish water. That was my opinion. I saw it growing there finely. I came very near omitting to make one statement, which I will make now, because if any of you gentlemen intend to go into the raising of the pecan, there is another kind of tree that since I planted my trees I have become acquainted with, the Louisiana improved pecan, which is quite different, not of the Texas variety, and I have undertaken to raise my trees from the seeds.

PROFESSOR HILGARD: Have you ever noticed what has been complained of in the Santa Clara Valley, that the nut is scanty of kernel?

JUDGE HEATH: The fruit grown on my trees never amounted to anything. The fruit I planted was perhaps the finest I ever saw. There was no blossom on them until they were fifteen years old, and when I went, because of their tardy blossoming, to examine the nature of that tree in its native country, from what I learned then I do not believe the Texas variety is good, except you have it on the river bottom; I do not think it would ever amount to anything here in any other place.

MR. WILLIAMS: I will say this, that on the best authority—the gentleman speaks of two varieties, one from Louisiana and one from Texas—I will state again what I have noticed. I have known nuts that came

from Texas to be planted, but probably not one in ten thousand of the trees will produce that nut. It is round at the end and pale gray color, while the other is a dark nut, prone to distinct ends, and you won't find one of those trees in ten thousand. He says no transplanted tree will be a fruitful tree. You must plant the nut where you want the fruit, or else it will be an unfruitful tree. This point has been impressed upon me. I am inclined to think it is true. If I wanted to succeed, I should get the finest, light gray, round nuts, very soft shell, and plant them right where I want them. I am very sorry to hear that it is not going to be a success, and yet I would be willing to try it on that basis, putting it near the river, and giving it a good fair trial, believing that some time in the future it would be a rival to any nut-bearing tree in the place.

JUDGE HEATH: When I got my pecan seed, I did not pay any attention to this cutting the taproot, because it is the veriest humbug. I claim, any taproot tree can be cut with impunity, and if planted with care it will grow. It may not grow the first or the second year quite so fast, but if taken care of, in three years' time you cannot tell whether the taproot has been cut or not. I planted the seeds, which were shipped from Texas, and I left three of my trees standing; they are standing now. The transplanted tree, which was broken off, the larger size, blossomed before those that stood in the nursery and never were removed. I have a dozen trees that have the taproot cut. You can cut them with impunity, and if you will come to my place I will show them to you.

MR. WILLIAMS: Mr. President, I am very glad to meet the gentleman to-night, because he has settled a question that has been unsettled in my mind for a long time.

MR. LELONG: This is a very important matter to our State. I took a trip to San Antonio to look into the pecan question. When I was in New Orleans I heard of a man who had some very fine pecan trees, and I went to see them. He had about three and a quarter acres of pecans. I went through the place and they were full of fruit. He said he had grown those trees for some time, and he said that he did not think the people who got those nuts would ever make a success from their planting. He said his trees were grafted. He said that people planted the nuts, and nothing comes true from the seed. That had a great effect on me, because the nut trees that have been planted in this State have been planted from the seeds, and I know one large grove in this State planted from the seed, and in that grove you can see over twenty varieties of nuts. Now, several years ago, we planted the French variety from the seed. The trees were grown from the seed and they never bore. Near Santa Barbara, there were four hundred acres planted out. I know of a large grove in Alameda County, the owner of which tells me they do not pay. He says he has been trying to graft them over to prunes. In later years, Mr. Hatch planted a bitter almond tree, and from this almond he produced a great many varieties. From that bitter almond the finest almonds that grow in California were produced. It would be well to follow up these experiments. I have investigated as much as I can, and if there is a tree found anywhere suitable to our climate, it would be well to bud from that tree, instead of planting from the seeds.

The meeting then adjourned until Friday, at 9:30 A. M.

XXVII.

TRANSACTIONS OF THE FOURTH DAY.

LOS ANGELES, November 24, 1893.

Vice-President GRIFFITH in the chair.

NEXT PLACE OF MEETING.

MR. BERWICK: I believe it is usual for this convention to meet alternately in the northern and southern districts of California. We have, in our meeting here, met the petition of Los Angeles County. I move that next year we meet in a northern county. There is nothing so beautiful in life as a path strewn with roses.

"Roses, roses, all the way, and
Roses, roses, all the day."

So I move that we accept the invitation of Santa Rosa to meet there. This motion was seconded by Mr. Crawford, of Santa Rosa.

MR. MASLIN: Mr. President, I have the honor to nominate Sacramento as the place to hold the next annual convention of the fruit growers. It has been the custom, Mr. President, to make the circuit. About eight years ago, the City of Sacramento held the convention of fruit growers. It has made the circuit of the State—Santa Rosa, Santa Cruz, San José, Los Angeles, San Francisco, and Marysville. Some of us think it better that we should commence again where we started. Sacramento has ample hotel accommodations. It is, at present, more the seat of the fruit interests than the coast counties. There is, at the same time, Mr. President, a peculiar reason for holding the next annual convention at Sacramento. We want some legislation, and at the coming session of the Legislature there will be probably some members of the Legislature in the City of Sacramento. The State Library is there, with all its means for getting the information we want to present to the next Legislature. The capitol is at our service, as the Secretary of State has informed us. Attendants are there, and all the means for holding an agreeable session of the fruit growers. I hope I will receive a second to my motion.

The motion was seconded.

MR. BERWICK: That is the reason we want it in Santa Rosa; we are a little out of the line of the railroads. We want to get into this coöperative shipping process. We want to get the convention there, and we believe it will stimulate our people to enter into this coöperative way of shipping fruit.

JUDGE TILDEN, of Niles: Mr. President, I would suggest, as a compromise, a city between the two, and that is the City of Oakland. It is a beautiful city, plenty of halls, which will be furnished free, and all other attention given to this convention that is desirable. Then, we are near

San Francisco. If any of the members attending have any business there they can attend to it at the same time. I believe you will get a larger attendance there than at either of the other places. I hope I will hear a second.

This motion was seconded.

The question was put on the motion to meet in Oakland, and lost.

The question being put on the motion to meet in Santa Rosa, it was lost.

THE CHAIRMAN: Now we will take the question on the motion to meet in Sacramento.

The question was carried in favor of Sacramento.

THE "ROYAL" MESSINA LEMON.

MR. BOYD, of Riverside, entered protest on behalf of Oscar Morris, of San Bernardino, as to the conclusions arrived at by Mr. J. E. Cutter, in his essay on the Royal Messina lemon, as not being warranted by facts.

MOTION TO RECONSIDER.

MR. SPRAGUE moved to reconsider the vote whereby action on the resolution on railroad nationalization was referred to the next convention in order to discuss the same.

Lost.

THE "ORGAN" OF THE FRUIT-GROWING INTERESTS.

THE CHAIRMAN: The first order of business will be a resolution written and sent here by Colonel Otis, of the Los Angeles "Times." The Secretary will please read it.

The Secretary then read the following resolution:

WHEREAS, The fruit interests of California are among the most important of the State, in fact far exceeding those of any other one industry; and whereas, it is desirable that we should have the cordial support and coöperation of the entire press of the State, upon which the welfare of our great industry is in a measure dependent; therefore, be it

Resolved, That it is the sense of this convention that no particular publication, horticultural, agricultural, or otherwise, be designated as the special "organ" of the fruit-growing interests, believing that our material welfare will be better subserved by enlisting the general support of the entire press than by discriminating in favor of any class publication; and be it further

Resolved, That this convention recommend to all horticultural and agricultural associations of the State the adoption of the policy as outlined in the foregoing resolution.

On motion of Mr. Holman, duly seconded, the resolutions were unanimously adopted.

The Secretary then read the following:

REPORT OF THE COMMITTEE ON TRANSPORTATION.

After due deliberation we find that improved service and quick time are absolutely essential for the successful marketing of California's fruit crop.

As the railway companies have already signified their intention of giving fruit growers quicker time for the season of 1904, viz.: from Sacramento to Chicago, 116 to 120 hours, we ask that proportionately good time be given from all points in this State to all points in the Eastern States.

We earnestly believe that by remodeling our ventilated fruit cars to conform as near as practical to the general style of refrigerator cars, and discontinuing the use of ice, the question of rapid transit would be greatly facilitated. In remodeling these cars we would suggest that the latest and most approved system of ventilation be introduced.

Your committee believe that a very large percentage of our fruits for Eastern shipment

can be safely and successfully transported in such ventilated fruit cars without ice, saving to growers the cost of refrigerator service on three fourths of the overland shipments. In this connection we ask that the weight of refrigerator carloads be reduced from the present minimum of 24,000 pounds to 20,000 pounds. We ask for this reduction in weight, as we find it impossible to load 24,000 pounds of many varieties of fruit into a car and properly refrigerate the same.

We earnestly recommend a uniform reduction of the present freight rates on fresh fruits, knowing that a lower rate would greatly assist in wider distribution of our fruit products. We respectfully urge that the transportation companies take prompt action, with a view of insuring quicker time and better service for the movement of the fruit crop of 1894. We further ask that such special service be performed by the railway companies at a minimum rate of freight not in excess of the present rate of \$1 25 per 100 pounds to Chicago and common points.

H. P. STABLER, Yuba City, Chairman.
C. W. REED, Sacramento.
I. H. THOMAS, Visalia.
A. SCOTT CHAPMAN, San Gabriel.
NATHAN W. BLANCHARD, Santa Paula.

MR. PATTON: Mr. Chairman, I desire to offer an amendment to that resolution, as follows:

That the railroad companies, in simple justice to the fruit growers of California, should reduce the rate on oranges from $87\frac{1}{4}$ cents to 50 cents a box to Chicago.

Adopted.

The report was then adopted as amended.

MR. MASLIN then read the following:

REPORT OF THE COMMITTEE ON LEGISLATION.

Your committee report that it has considered the annual address of the President, and report that the President recommends:

First—A bureau of statistics.

Second—An appropriation for the importation of predaceous insects.

Third—A vagrant law.

A resolution has been passed requesting the Legislature to appropriate a sum of money for the importation of insects beneficial to fruit culture.

The committee has not had the time to prepare the laws embracing the subject of bureau of statistics, and recommend that a committee be appointed to prepare such laws and report the same to the next fruit growers' convention. If time does not allow the selection of a committee, this committee will take upon itself the task of preparing the laws.

E. W. MASLIN, Chairman.
R. C. KELLIS.
J. F. McINTYRE.

MR. BERWICK moved to amend the report by recommending to the fruit growers of California the careful study and consideration of the nationalization of railroads.

This motion was seconded.

MR. MASLIN: Mr. President, you cannot amend the report of a committee; you can submit that again to the committee.

[At this point President Cooper entered the meeting, and took the chair. Applause.]

The amendment offered by Mr. Berwick was adopted, and the report of the committee as amended was then unanimously adopted.

REPORT ON PRESIDENT'S ADDRESS.

MR. HOLMAN: Mr. President, I have a brief report from the committee of which I am a member, appointed to consider the address of President Ellwood Cooper, and we have to report, by your pleasure, as follows:

Your committee to which was referred the address of President Ellwood Cooper beg leave to report:

First—That the report as a whole be adopted.

Second—Since the transportation, legislation, and other committees have treated the specific suggestions in Mr. Cooper's report, we shall limit our suggestions to the recommendation that a committee be appointed to consider the question of establishing a permanent bureau to send out expeditions to every part of the world to investigate parasites and fungoids, and we recommend that its committee be instructed to report a full statement of facts relative to matters, with suggestions for permanent organization, and as to ways and means, to the next fruit growers' convention.

ABBOT KINNEY.
E. BOUTON.
ALFRED HOLMAN.

MR. HOLMAN, continuing: The other matters as to legislation have been so fully covered by the report of Mr. Maslin's committee, that we have felt it would not be necessary for us to meet with them.

The report read by Mr. Holman was, on motion, unanimously adopted.

MR. SPRAGUE: If I voice the general sentiment of the convention, I should be very glad if we could provide for a "general discussion" at the next session, and possibly the best way would be by a question-box. You are all familiar with that. Questions may be placed in it, pertaining to practical matters of the orchard, and those questions may be taken up, in any way the Chair may decide, and discussed briefly during that session of the convention.

POLLENIZATION.

MR. BERRY: Part of the business of this convention was in regard to the proper fertilization, but the question of the pollenization of the blossoms of the fruit trees was not entered upon at all. I therefore wish to quote an experiment that I have been making, for the last year, at my own orchard. There was a French prune orchard in Tulare County, where the trees grew very well, and became seven or eight years old, and are not bearing fruit. I found that the owner had no neighbors who kept bees. He had planted all of one variety of trees, which was the French prune. I suggested to him that perhaps the French prune did not pollenize. Like a great many other people, he was disposed to laugh. He concluded to try the bee proposition, and introduced several colonies of bees, and this last year was the first year that he had any fruit on his trees. At the same time I, myself, was doubtful whether the experiment would be a good one, but to test my own theory—I was surrounded with bees—I wrapped up some of the limbs on Bartlett pear trees; isolated them from coming in contact with the bees. I isolated the limbs so that the blossoms could not be pollenized by the bees, and gentlemen, on those limbs, and on trees that were prevented from being used by the bees, I had no fruit whatever.

Another case: In our district there is a gentleman, a fruit grower, named Mr. Anderson, who has a twenty-acre orchard, with which he is very successful, because he gives it his personal attention. Mr. Anderson planted on one side of his orchard a row of French prune trees. Those trees stood there until this year, which will be the ninth year; and during the third, fourth, fifth, sixth, and seventh years they had borne no fruit. A few years ago Mr. Anderson planted a row directly alongside of these, of Silver prunes, and the French prunes bore fruit as

soon as the Silver prunes bore fruit, and not before, showing that there was a distinct pollenization of the blossoms between the two trees.

In regard to pears, I have planted other pears alongside of the Bartlett, and wherever those have been planted I have had a crop; wherever the Bartlett stood isolated, I had none at all. You can consider these matters when you go home; you can make your own experiments; that has been my experience.

MR. SPRAGUE: Have you had any experience in that line with apricots?

MR. BERRY: No; I have not tested that with apricots, but probably it would result in the same way.

MR. BERWICK: Mr. Chairman, I had a similar experience with English filberts. They grew very nicely, but did not bear, and do not bear, and the reason is simply that the male blossom comes out in the fall very well, but the female blossom does not expand till spring. The male bloom is earlier; it falls off and dries up before the other blossoms are developed.

MR. BRAINARD: In regard to filberts, they are not very much cultivated; at the same time it is desirable to cultivate them. From experiments made by me, the filbert, when allowed to grow in the bush form, its natural shape, does not bear at all. We had bushes that did not bear half a dozen nuts. In every instance, when it was trained into the form of a tree, it bore heavily, and this, so the gentleman who owned the trees told me, had continued for several years, so that he was still sure of the value of that style of pruning.

APPOINTMENT OF COMMITTEE.

THE CHAIRMAN (Mr. Griffith): I now appoint as a committee to carry out the plans that were suggested in President Cooper's address, touching upon parasites, the following: Ellwood Cooper, of Santa Barbara; William Johnston, of Sacramento; Abbot Kinney, of Lamanda Park; S. F. Leib, of San José; General N. P. Chipman, of Red Bluff.

DISCUSSION ON ORCHARD CULTIVATION.

MR. SPRAGUE: If it is not desired to adjourn before 12 o'clock, which is our custom, and if there is nothing before the convention, I would like to raise a question concerning the cultivation of orchards. There have been in most orchards, in years past, differences of opinion regarding the necessity for deep cultivation. I would like to know the experience of those present in this respect. Of course I know there are differences in soils, which must be regarded, but as a general statement where the soils are moderately close, simply decomposed granite, so common in Southern California, whether it is the opinion of the horticulturists present, that—aside from the matter of weeds, which must, of course, be kept down—whether it is best to run your cultivator a little deeper, in order to get down to moist ground each time; or whether, providing the surface is thoroughly pulverized for a distance of two or three inches, that is sufficient to prevent such evaporation of moisture as comes from capillary action, where the surface is allowed to become hard. I would like Mr. Thompson to speak on this.

MR. THOMPSON: Mr. Chairman, as to whether it is desirable to cultivate orchards in the spring, and to plow deeper, in the absence of irrigation, I say, get down to where the earth is moist. In order to save the moisture from the air, it is sufficient to keep the surface thoroughly pulverized within a distance of two or three inches. I have never seen any very successful results from shallow cultivation. I recommend thorough and deep cultivation, especially at the last of the season. At the time when our last rains occur, or directly after our last rains—we cannot always tell when our last rains come—I would advise thorough and deep plowing. There is a great deal of winter cultivation that might be avoided, but it is advisable to keep up a thorough cultivation, not necessarily so deep in the early part of the season, but late in the season it should be deep and thorough.

MR. SPRAGUE: My questions refer to July and August cultivation.

MR. THOMPSON: I have never been in the habit of cultivating in July and August. I never cultivate later than the first of June.

MR. SPRAGUE: Do you have any weeds after that?

MR. THOMPSON: I handle them with a large weed cutter. As late as the first of July, our ground is thoroughly pulverized. I do not think cultivation after that is any advantage.

MR. SPRAGUE: If cultivation is the savior of moisture, why not cultivate all summer?

MR. THOMPSON: I believe that as you stir up the ground and expose it to the heat, you lose some of the moisture.

D. E. SMITH, of Santa Ana: I understand Mr. Sprague wanted to know if, after you have made a deep cultivation, a thorough pulverization, whether the next time you should go down still deeper, and loosen up more soil, and I think you should not.

MR. THOMPSON: I certainly would not.

MR. SMITH: You want to make the cultivation deep enough to produce a layer of loose soil on the surface, and no matter how deep we make that cultivation, if it is a thorough cultivation of the soil which is loose, it will dry out down to the bottom. It wants to be a sufficient deepening to prevent this evaporation. After you go that deep it would be a waste of time to go lower.

MR. THOMPSON: Did I understand you to say that if your mulching is deep it will dry out?

MR. SMITH: Unless it is deeper than anything I have ever seen.

MR. THOMPSON: If you have a good, loose surface of a foot deep, I know it will not dry out to the depth of that foot. If the ground is thoroughly in shape, it seems to me that continually stirring that soil is an advantage.

MR. SPRAGUE: He is trying to state what I tried to state. I seem to have not made myself clear. Is it desirable, in summer cultivation—I will say the latter part of June, July, and August—to cultivate the surface of the ground at all, in the absence of weeds, providing there has been suitable preparation of the ground in the early part of the season? If it is desirable to cultivate at all, must it be cultivated so that at each succeeding cultivation the ground will be stirred more deeply?

MR. SMITH: I understood Mr. Thompson to answer this in the negative; that it was not desirable to cultivate at all during the dry summer, providing you have no weeds, and, consequently, if it should be considered desirable to cultivate at all, it was not best to cultivate deeply.

MR. THOMPSON: If your soil has been properly cared for.

JUDGE TILDEN: I have seen places worked side by side, and each owner would plow the land and cultivate it in the spring, so that when the rains ceased the land was alike, mellow. One would stop there with the work, but the other would keep on during the months of June and July and until the commencement of the packing of the fruit, and I noticed the one that kept on cultivating got the best fruit of the same variety. Take peaches, for instance; you get the largest peaches; they bring more in the market. I noticed the same fact with apricots and other fruits. I have noticed that those who plow deep and pulverize well get better fruit, right side by side with those who plow shallow, where they both keep on cultivating.

PROFESSOR WOODBRIDGE: This brings up the whole question of green crops. The gentleman has spoken of cultivating for the purpose of keeping the weeds out. Now, these weeds, and all kinds of grass, are great nitrogen producers, and take certain kinds of food from the soil, and if they are turned in in time they are in more soluble condition than later. Every time you turn the soil in, you loosen it up, expose new surface to the air, and the moisture is again started afresh; insoluble plant foods become soluble plant foods, so that the plant can take them up. Now, can you decide whether it is best to cultivate often? You might make comparison between the orchards I have in mind. They were originally one orchard, and they were the Navel orchards of Southern California. One of these gentlemen plows his orchard twice a year so deeply that he breaks off many of his little surface roots. Every time a root of that kind is broken off, it sends out four, five, or may be six more roots, which roots are feeders. He fertilizes his orchard continually with stable manure. Of course, the manure is full of seeds, which sprout, and you will see a little green cropping up all the while. That is plowed under. This gentleman got from his orchard last year as much as nine boxes of oranges more than ever before, and he has got a larger crop than the preceding year. His next-door neighbor, who does not fertilize and does not put on any green crop, does not have as large a crop as he does.

MR. SPRAGUE: The discussion must certainly be divided and kept solely to the non-irrigated sections and non-irrigated fruits. The method you mention would not do in the irrigated section, because the weeds would grow too fast and form an obstruction on the surface.

PROFESSOR WOODBRIDGE: Citrus fruit trees are apt to have off years. When such is the case, as soon as the tree is through its bearing and the fruit is packed, it is well to start the green crop and let it grow up, turning it under during the winter season when the tree is doing nothing, and the next year the blossom is more apt to set.

MR. SPRAGUE: It would seem to be desirable to know what we are going to do this afternoon. I move you that the general work here be considered in order for discussion this evening, and by way of giving definite form to this, that a question-box be arranged, so that questions which are placed there can be answered promptly.

This motion was carried.

On motion, the meeting then adjourned until 7:30 P. M., at the Chamber of Commerce.

XXVIII.

EVENING SESSION.

The meeting was called to order at 7:45 P. M. by Vice-President GRIFFITH, who took the chair.

THE CHAIRMAN: The last resolution offered and adopted before we adjourned this morning was to the effect that there should be questions asked and answered upon the various matters. Those who have questions to ask bearing upon any subject will please send them up to the table and we shall be glad to give them full consideration. There is plenty of paper here for those who desire to write questions.

MR. BERWICK: While the questions are being collected, I wish to move regarding the Nicaragua Canal resolution; that the Secretary be directed to forward the resolution to all our members of Congress.

The motion was carried.

THINNING FRUIT.

MR. KELLS: I am glad this subject has come up before the convention is closed. It is an important subject, but it is a subject too large and of too uncertain a quantity for a person to write on without much consideration. So, I think by opening the subject in this way, it will be of much more interest and more to the point than if conducted on paper. I will confine myself to deciduous fruits, which are about the main fruits that are grown in the Sacramento Valley. Where I live, in Sutter County, we grow mostly peaches, prunes, and apricots. We commence our thinning about the time the peaches are the size of a small marble, and we really do not adhere to any particular rule. We size up our trees, as you might say, as to the condition of the tree, the age of the tree to some extent, and about how much fruit this tree will be able to carry and produce good, large fruit. We will say a tree that is three years old, which is the third crop of the peach tree, we do not want it to bear a great deal of fruit, and we pick off nearly all the fruit on the tree; at least, after thinning, it seems as though nearly all the fruit had been picked off. As the tree gets older and the roots get deeper into the ground, and as it tends to draw on the moisture better, and has a larger output of wood, and the wood is more matured, we leave the fruit thicker, and we begin to thin our peaches about four to six inches apart. When we say four to six inches apart, we do not mean two inches apart. The average thinner, when he gets through thinning peaches four inches apart, will leave them really two inches apart. So we lay down a rule of eight inches, and then we find they thin to about four inches. We try to thin our peaches so that they are on the main branches of the tree particularly, and not on the minor limbs or twigs of the limb. It is where the peaches set most heavily, on the light, lower limbs, and they want to be picked off pretty thoroughly. We had Senator Buck at our horticultural show in Sutter County one time, and we tried to have him explain how he would do the thing, and he told us that he expected to have his tree produce four boxes of peaches, and he would try to distribute the peaches on that tree so that it would produce four times eighty, or say 400 peaches, and by distributing that amount of peaches over a tree that would only produce twice that amount, you would get that many peaches of good size, and the tree would stand the load without breaking

the limbs, and produce new fruit wood for the next year. It would be in good condition from year to year, carrying the fruit in that manner. I think many of us make a mistake by letting our young trees overbear in the first two or three years, from the fact that the tree is unable to produce new fruit wood for the coming year. If we leave the fruit on, the fruit is very small and inferior and is only fit for drying, canning, or shipping. We thin, largely for the purpose of canning fruit, and the canneries in our valley do not can anything less than two and a half inches in diameter. So, when you thin peaches four inches apart—where they are not four inches apart, they touch one another when they are full size—so that although four inches may seem a good ways apart when the peaches are the size of a small marble, you can readily see that a tree would carry a load distributed all over the tree. Eight inches comes nearer the rule than four inches. There is no definite rule. I think we must gauge the thinning by the condition and size of the tree generally. I do not remember the rule of thinning plums or prunes in our valley or in Northern California. So far as I know, we do not thin apricots to any extent, but where the principle has been put in action, I find it has paid the grower well. When we have a heavy crop of apricots, and they set in clusters, I think a man ought to thin them. I do not know what else I could present on this subject at this time. I am better at answering questions than I am at putting them, and if any one present would like to ask questions from a practical standpoint, I think I can answer them, perhaps, and answer them from personal experience and from successful experience.

MR. BERRY: Mr. Kells, in giving your instructions to your men to thin your fruit, do you specify that they shall select the best possible specimens on the limbs, where they can conveniently do so, or do you make any material difference in the selection?

MR. KELLS: I invariably instruct them to select the best fruit. We sometimes have to pick off some that seems as though they should be left, when there is another peach near by that seems to be a well-developed peach. In that case, that is the peach I would rather have left, and I instruct our help to work in that manner. We try to keep our fruit within the center of the tree as much as possible, and not get it on the ends of the limbs.

MR. BERRY: Have you sometimes found, where you have to thin twice, and you have got the time, or the tree has become in consequence of thinning the first time too heavily loaded, and the stone in the peach has become too hard, that you are benefited by the thinning at that time?

MR. KELLS: Yes, sir; you had better take them off the tree than to try to mature them and make a crop. I have been thinning for a number of years, and I have never gone over a peach orchard and been satisfied with one thinning. At certain periods I have gone over them and thinned them three times, in order to get them as thin as I want. Sometimes in the first going over you think you have them thoroughly thinned. If I was crowded with my work and found my peaches were too thick after the pits were hardened, I would pick them off afterwards.

MR. SILVEY, of Monterey: I would like to ask the gentleman if he irrigates?

MR. KELLS: No, sir.

MR. SILVEY: Then you do not know, in case you do not irrigate, what the condition is where you do irrigate.

MR. KELLS: I think where they irrigate in Placer County, they thin more thoroughly and try to get a large fruit. They thin with a view to getting a good sized fruit, and preserving the tree for another crop. It is a bad policy to let a tree produce a great crop, with the expectation of making a sum of money in one year. You must provide something to carry that tree along for the years to come, in order to make money out of peaches or apricots.

THE CHAIRMAN: The Chair might ask one question on the subject, as he has some of those trees. If there was a light crop, would it be advisable to thin them, or do you confine your thinning especially to a heavy crop?

MR. KELLS: I will say, Mr. Chairman, that it will depend something on how light it was after we get through thinning. Sometimes, after the first thinning, the peach being very small, we do not think there is anything left on the trees. A stranger would look into the tree and would not see the fruit, because the foliage will, to some extent, cover them, and he would think it was a very light crop. I think when peaches are first setting, it would pay a man to go over them and thin them, because he would have more of them than he thought for. If a tree is in a condition that it sets very light, it is not in condition to carry a very heavy crop anyhow, and they should be very thin, so that it would carry the load through and propagate for another year.

QUESTION: Take Silver prunes and Egg plums—that class of fruit—how do you generally thin them?

MR. KELLS: Well, we do not thin plums and prunes. But since you speak of it, we have thinned a good many Hungarian prunes, and I make it a rule to thin mine something after the style of peaches. We thin them down to four inches. We take off the double ones and thin down to not less than four inches. A man thinning will always crowd on the space of four inches and get to thinning to half the distance that you have laid down.

IRRIGATION AND CULTIVATION.

MRS. JONES then read the next question, as follows: "What are the methods of irrigating and cultivating orchards in Central and Northern California?"

MR. ADAMS: Mr. President, in the Santa Clara Valley they irrigate in winter. The streams in the Santa Clara Valley do not retain their water for summer irrigation. The rainfall is quite heavy in the winter time, and they endeavor to irrigate thoroughly in the winter, so as to insure the ground a thorough soaking. They continue that at reasonable intervals, as long as they have water, and then they stop. Now, there are some few farms in the Santa Clara Valley irrigated in the summer, but it is by artesian wells, or where they are situated so that the water can be pumped up. There is no flowing water there anywhere for summer irrigation.

MR. SPRAGUE: Would they not irrigate heavier and later if they could get the water?

MR. ADAMS: I think they would. Of course, it depends on the crop. It is a question what they would do.

MR. SPRAGUE: How were the peaches and apricots?

MR. ADAMS: Well, they are inclined to fill out with water; so with cherries—they like to fill them up with water before they ship them.

MR. SPRAGUE: If they dry the fruit, how much more irrigated fruit does it take to make a pound of dried fruit?

MR. ADAMS: We are experimenting with that. In our coöperative concern there is a great disposition to put irrigated fruit in with unirrigated fruit, where it all goes into a pool together. Those who do not irrigate are not willing to put a given number of green pounds against a given number of irrigated pounds. It is evident it shrinks more, and many think it shrinks so much more they are unwilling to stand the risk. That is one of the sources of friction in our coöperative organization. As irrigation increases there is more and more tendency to separate the irrigated from the non-irrigated fruit.

MR. BERRY: I have had some experience in our county. Take peaches in Tulare County irrigated in the spring and winter, and the difference between irrigated fruit and fruit not irrigated is an average of two and a quarter pounds.

MR. ADAMS: In Santa Clara County we say it takes five and one half pounds to one.

MR. SPRAGUE: What is the best early peach to dry? The Foster?

MR. BERRY: The Foster is one of the best. While there has been a great deal of row about the Muir, I do not like it. The wood is extremely brittle. The peach ripens in one or two days, and if not properly cared for will rot before we can get it off the trees. Our next variety would be the Late Crawford, which is a far better peach than the Early Crawford. When it comes to eating, naturally no peach exceeds the Early Crawford. We have two varieties of Orange Clings, and after them comes the Salway, for drying.

MR. HUDSON: Mr. President, I have been drying peaches for some little time. We irrigate in our part of the country. We do not water, we irrigate, and we irrigate very thoroughly; that is, I do. I irrigate in winter all over my land, at from four to eight inches in depth. I hold the water there from one to four days. After the peaches and nectarines are set, I flood again. I also plow both ways and cultivate both ways and harrow both ways. Then, I am not satisfied with that, but I hoe. That is the way I commence. Now, the question is whether you can dry fruit that is irrigated in that way. Santa Clara County will say we cannot, and other counties will say they cannot and they also think they can raise fruit; that it only takes four and five and six pounds of fruit to make one pound of dried fruit. Now, to get at the exact amount that it takes. I have weighed, for three years, every pound of fruit I have dried, and I have dried from twenty-five to forty-five tons each year. I found after all this irrigation, and I have flooded from one to four times every year, that I always had a good crop. I have always thinned closely and always pruned closely, but when I came to weigh up I find it takes six and three fourths pounds of peaches of all kinds to make one pound of dried fruit, and if you can irrigate, or find any one who irrigates any more thoroughly than I do, I want to see him. I am on sandy land. That makes some difference. My land is principally sand. I experimented with white nectarines two years ago. I did not irrigate them at all, nor let a drop of water on them. This year I flooded them twice thoroughly and there is very little difference in the crop. That is my experience.

Now as to prunes. I flooded my prunes this year four times. I have only a few—147 trees. Those trees averaged me 310 pounds to the tree. I sold them at 4½ cents a pound. They paid me \$754. It took less than three pounds of prunes to make a pound dried, and they averaged seventy to the pound. We have so few that we do not grade them. I am strongly in favor of irrigating, or flooding heavily, all the tree fruits. Now, I want to say that about five years ago there was such a feeling in the northern part of the State that they would not buy our fruit and would not take it. I had some pears, and Mr. Lewis, a neighbor of mine, said that there was a cannery at Los Gatos, and that they wanted my pears. I sent them up there and did not hear from them for some time. They had always said the pears would not keep. I went up there and found every one of the pears in the boxes. They said that they did not can them because the fruit was keeping all right, and that they were compelled to can pears that had come in since which were irrigated, whereas mine were not irrigated. Now then, it seems to me that when we come to look into the history of this thing, you cannot guess at it; you have got to weigh every pound, and I do not think that irrigation is such a great detriment to the fruit. I know it is not to the size; I do not think it is to the quality. My land is getting pretty well sub-irrigated now, and I would like to hear from any one that has tried the plan of weighing and knows just what he is doing the entire year, and can tell whether the unirrigated peach is so much superior to the irrigated.

MR. MASLIN: Mr. President, I want to correct any impression that our Southern brethren have that there is any regular system of irrigation in Northern California. You can see, from the formation of the country and the rainfall, that there would not be any regular system. For instance, take Red Bluff and Shasta. I give Shasta City, where the rainfall is 100 inches for the year. Then come down to Red Bluff, where the rainfall is about 30 inches; at Sacramento the average rainfall in 20 inches, and then the rainfall increases at the rate of one inch for every one hundred feet of altitude. Colusa, Sutter, and Sacramento Counties do not irrigate, and Shasta and Tehama irrigate freely, so there is not much irrigation practiced in Northern California. In Placer County, with which I am somewhat familiar, we do not winter irrigate. If I could have my way, we would winter irrigate. We depend on ditch water, for which we pay a price. That water is brought from the ditch, put in the reservoir, and irrigation does not begin until late in the spring. Pruning is begun sometimes in November and sometimes in April, depending whether a man is afraid of frost or not. There is not much irrigation until the fruit begins to make its seed, or swell, and then there is what they call a copious irrigation, but which, in the San Joaquin Valley, would not be called copious irrigation. That depends upon the power of the soil to absorb moisture in the winter time. The granitic soil—the absorbing power not being great, the soil being five or eight feet deep—requires great irrigation. In the light soil, which absorbs moisture in the winter time—the rainfall is about 40 inches—there is not so much need of irrigation. Every man is a law unto himself. As to the system pursued, it is the basin system. I do not think that I ever saw the Riverside system practiced in any part of Northern California. The water is taken from a reservoir and it is carried down, sometimes by runs, one on each side of the tree, sometimes between the

trees; but they do not construct those ditches so that there is any regular system of irrigation.

MR. MOSHER: I think that it makes a great deal of difference how the fruit is dried. In peaches, before they are thoroughly dried (that is, dried up hard), if they are put in a place where they will dry slowly, they will not dry out so much. That will make quite a difference. And then it makes quite a difference how ripe they are when picked. You know that the riper the fruit is when picked, the more sugar there is. All these things it is necessary to watch. I believe in irrigation, and after irrigation, cultivation. The heavier the soil the more cultivation. That is my experience, and I think that we cannot cultivate too much. We claim to till our land as late in the season as we can, before the summer is entirely gone, and turn under the weeds as much as we can so as to get all the humus. We cultivate with cultivators that will not turn the soil to the air only enough to keep up the circulation. In San José, I buy largely of prunes, and when I can I purchase irrigated prunes, which have been carefully and thoroughly irrigated. I prefer the irrigated prunes in the Santa Clara Valley, because they are larger and finer. They drop more evenly from the tree. If the ground is not cultivated, the tree suffers from a lack of cultivation or a lack of irrigation, and the prune is apt to hang on the tree. When you see a prune hanging to the tree or some dropping off before they are ripe, there is something the matter. There are three things that we must more thoroughly understand, and they are cultivation, irrigation, and fertilization, and the more irrigation the more cultivation. Now, we never need to irrigate after May. We aim to do our last irrigation about May. If we irrigate later than that the prunes are apt to fill out too fast and then crack open. For instance, apricots, when they are not irrigated, and the warm weather comes on, there is a time just before they get ripe when they seem to fill out. The last week probably they grow very much faster. They are really filling out, and turning the different chemicals of the apricots into sugar. If there is not enough moisture in the ground to do this, and the hot weather comes on, they dry on the tree and get hard. They are not usually as rich. But, if thoroughly irrigated at the proper time, this does not seem to happen.

JUDGE TILDEN: Mr. President, I have been very much entertained in hearing this discussion in regard to irrigation. In my vicinity, in Alameda County, there is quite a disagreement among the fruit growers as to the desirability of irrigating. There we have the deep alluvial soil fifteen to twenty-five feet deep. We come down to gravel, and, of course, it will retain a great deal of moisture. While we have no general system of irrigating, we have an irrigating ditch from Alameda Creek, running out several miles, for three or four miles, furnishing irrigation. This they claim is a great benefit, although some of them claim that it does no good. They say it is an injury. Our land, which they claim is level, is not exactly level; it is, of course, a little rolling. Looking over it with the eye, you would say that it was level, and if you surveyed it you would not find from six inches to a foot difference in ten or twenty rods. Therefore, we lay it off in blocks, usually about forty feet, and then we run the water on, and that is the way I do and so do all my neighbors. We run the water on, and we calculate to put on about six to eight inches depth of water; ten to twelve inches I have put on. Of course, we do not measure it accurately. I have put on twelve inches of water, so that

the ground is thoroughly soaked. If you happen to step on it, you will go down so that you want some one to pull you up. In the winter the ground is soft. Of course, where we irrigate in winter, as soon as it is dry enough to plow and the weather is suitable, we plow at once and cultivate, and bring it into a fine state of cultivation and keep it so. We do not irrigate, then, any more. In doing that we get very good peaches—large enough for our canneries; $2\frac{1}{2}$ inches is the size the canneries require, and as high as $2\frac{1}{2}$ inches. I have for several years sold my peaches to the canneries, and I had no trouble as to the size. Generally, before they irrigate, they plow the land, get it in very good condition; then some let the water run in ditches. They plow two or three ditches each way and let the water run through, and fill these up two or three times. The land is pretty well soaked. Then they get a good crop. Within the last two or three years, one or two commenced by pumping the water. They wait until the second crop, after the pit is formed, and then they plow ditches through the orchard on each side of the trees, and then they pump the water through the ditches and let it run through on both sides of the trees. They do that after the pit is formed and the second growth commences, probably two or three months before the peach is ripe, and they get good peaches whenever they do that. They also get fair peaches without irrigating at all, except it is a very dry year, when the peaches are small.

MR. KELLS: I have followed Mr. Hatch's plan to a great extent and have become a convert to that method of cultivating orchards. His method is to plow early in the spring, and to cultivate from the time he first plows, every ten days or two weeks. He thoroughly cultivates from the first of May until the middle of August. I would like to say that I got my style of cultivation largely from Professor Wickson, three years ago. The reason I made a point of cultivating a little deeper every time I cultivated, was from the fact that Professor Wickson suggested the idea himself, or at least that was the conclusion he had arrived at at that time. When we cultivate about the same depth each time, we form a casing between the moist land and the mulching, and the idea was to break that casing every time we cultivated, to give the moisture a chance to rise.

MR. SPRAGUE: That was the theory upon which I proceeded last year, as did also neighbors of mine. This year we have taken another course, plowing deep in the spring, with a deep cultivation following while the land is moist, and then following with the harrow and weed cultivator. After a rainfall of only 11 inches, in August and September you could go over that ranch and with the toe of your boot find moist soil almost anywhere. That is our experience. The trees are one or two years old. As compared with the result last year, it ought to be pretty nearly the same.

MR. BERWICK: There is very little draught from a tree two years old.

MR. SPRAGUE: It is to prevent the evaporation that this cultivation is made, and my relation of this matter is to show that, as nearly as I can read it, we did not gain anything by the deeper cultivation last year.

MR. BERWICK: But the evaporation later on is by exhalation from the trees when they are in full growth.

MR. KELLS: I would like to make a correction. When I spoke of the Rio Bonito orchard, I spoke of his method of cultivation. I referred to the result of his cultivation in Placer County, which is foothill land,

while, of course, we all know that the land at Rio Bonito does not require the amount of cultivation that land does at his Placer County ranch, or his Yolo or Suisun ranch.

MR. BERRY: In my ranch I have adopted a system of cultivation. I use a 44-inch, reversible disk harrow, 8 feet wide. I do not plow at all. I use that harrow after the rain. We only have an average of 8½ inches of rain. The water-level is 7 feet deep, and in the winter time 5 feet deep.

MR. SPRAGUE: That makes an entirely different condition.

MR. BERRY: I want to get down to the cheapness of cultivation, which I get with an 8-foot, 44-inch disk harrow. When we first started we could not get that reversible, and they had a tendency to till the ground by reversing. You can keep the ground in good shape putting four horses abreast and one man to drive. As the trees grow larger, of course you cannot get through the row. I am able to conduct that ranch, so far as the care and attention to the trees, consisting of peaches and prunes, 440 acres, by an average expenditure of the labor of two white men and two Chinamen. That does not include pruning or the picking of the fruit. I mean the cultivation and the necessary care of the trees. I think I have got it down as close as anybody can get it down, in regard to the expenses on a place of that size. I did not put any weights on this 44-inch disk harrow in the beginning, but gradually I commenced adding weights to it. It has been my aim to get over the ranch with this disk harrow about once every fourteen days. Sometimes it is not exactly, but I aim to do that, and I roll over every weed that grows. I have found, so far as that county is concerned, it has been the most economical plan I have ever pursued.

MR. MOSHER: Why do we cultivate? We cultivate to get a circulation of air through the ground. It is to loosen the ground so that we can get a circulation of air. It helps to fertilize the soil. Now, what is it that causes our trees to die of sour sap? Isn't it caused by water settling around our trees and making the ground soggy?

MR. SPRAGUE: Not where we have 11 inches of rain. In new sandy soil, of course, there is a circulation. Now, I think every one that has an orchard has an experiment station. I have an orchard, and I know it has been very much more experimental than remunerative to me.

DESTROYING GOPHERS.

MRS. JONES then read the next question, as follows: "What poisons have been most successful with gophers?"

JUDGE TILDEN: I have found strychnine the best thing we can use for gophers. Those who have much work to do usually take carrots and slice them up. Have a man sit down and prepare a quart or two quarts—it depends upon the land to be gone over. Then put a little strychnine in each piece with a knife. We find we have to dig down; do not put it in the hole. If we put the piece of carrot in the hole it seems to be thrown out. If in the summer, by striking around the hole with a pick, you find the main hole, and then throw in two or three pieces of carrot with poison on them, which you cover up, it is very seldom the gophers will be seen in that place again. When I went onto my old place it was full of holes. I believe in going through the orchard

about every ten feet you would step into a gopher hole. The ground was honey-combed with them, and in a little while I got rid of them.

MR. BARRY, of Alameda County: Have you found that irrigation did a great deal to get rid of the gophers?

JUDGE TILDEN: Irrigation would, of course, if the water stands, tend to kill them off, but many of my neighbors do not irrigate, and raise a large crop of gophers. I told my men that whenever they found indications of a gopher to stop and poison him, and I make it a rule to have green carrots the year around by setting them out in the garden at different times. It did not take many, of course—one or two carrots at a time. Whenever you find a gopher hole, go and poison that gopher, and I think if my neighbors were all as careful as I am, we would not have many gophers. Another trouble: they will get under the road, and we have to go along by the side of the road. Some of my neighbors have tried bi-carbonate sulphide, and say that it works very well for awhile. There are other poisons, but with the use of strychnine there is very little trouble in keeping the gophers down.

MR. MOSHER: I have a very good remedy for killing gophers. It has been very effective and is very simple. I take a quantity of prunes—we have them always on hand, so that when we see a gopher hole we attend to it right away. We open them and take the pit out, being very careful not to touch them with our fingers. We take one up with the point of a knife and take as much strychnine as will remain on the end of a penknife and put it in the prune. We have a number of old sticks, about the size of a leadpencil, with which we pin the prune together. We have an old pail full of these sticks. Whenever we see a gopher commence digging, we go and put these sticks in the hole. The reason for putting this stick in the hole is, if you put the prune in alone, the gopher digs it out. The gopher is very fond of prunes, and we get them every time. Another thing: we always know whether they eat the prune or not, because there is the stick to show.

A MEMBER: This season I have noticed in the drying-ground that they have even come up and gnawed through the dried apricots. Late in the season, when the apricots were perfectly ripe, I have placed them on a tray for the purpose of sprinkling them with strychnine, and we can kill them every time with it. In the spring of the year, when you find a gopher hole open, if you put a little strychnine in that hole, it will kill them. You must understand their habits. I find that in using the apricots, I can dry them and put them away in tin boxes, and they are available at all times.

MR. BARRY: Mr. President, I take a young malva, split it with my knife along the thick branch, leave the leaves on top, put the knife in the strychnine and put a little of it on the leaf, and put that in the hole. During the whole time I have tried it I have never failed to kill the gopher.

THE CHAIRMAN: I have a way of getting rid of them without strychnine. A gentleman stated to me that the pleasantest way to get rid of them was to have plenty of cats, so I thought I would coax the cats around me, as they were plentiful. We decided that the best way to get the cats was to coax them by feeding them, and so we put out a pan of milk every night. The result was that we had a large number of cats. Between that and the irrigation, we have very few gophers, if any. I have not seen any for months on the ranch.

TREATING THE SURFACE OF THE ORCHARD.

MRS. JONES then read the next question, as follows: "Is it best to roll or otherwise press fine the surface of an orchard?"

MR. SPRAGUE: Mr. President, in the absence of further remarks, I should say it is better to leave the ground in such condition as not to require the application of rolling. If the ground is harrowed so that no lumps are found, then it is better to try to pulverize no further.

MR. MOSHER: Mr. President, I think it is a very bad principle to roll land and leave it in that condition, as it leaves the surface very smooth and causes a very strong reflection from the sun.

TRIMMING YOUNG TREES.

MRS. JONES then read the next question, as follows: "Are young trees or vines likely to be injured by being trimmed in the fall, before fully dormant? If so, why?"

MR. BERRY: Mr. President, this question seems to open up the whole question of pruning. Some years ago there was a peach orchard started in Bakersfield, and the phenomenal production and wonderful size of the fruit from that orchard were so striking that I, with one of the best known fruit growers in the State of California, purchased a part of that orchard. He and I, in talking over the matter, decided that we were pruning too much. Since that time he has adopted the plan a good deal, and I have adopted the plan of leaving them alone altogether. Last summer, when the peaches on my orchard were growing, I pruned those particular peach trees. I know that I was criticised by some of my neighbors, and some of them said that Captain Berry was crazy. I had the largest peaches, I think, ever grown in the State. I have not pruned those trees any more, and do not intend to. We are pruning our prune trees in Tulare County—those that have been planted one year. After that we do not prune them any more. With regard to apricot trees, I prune them in June. With my Bartlett pear trees, I do the same thing in June. I have obtained excellent results.

MR. LELONG: Is the pruning you do in June the cutting back of the old wood, or the new growth?

MR. BERRY: The new growth.

MR. LELONG: Then you do not cut the old growth?

MR. BERRY: Not any more that year.

MR. LELONG: You leave the old growth alone and only attend to the new.

MR. BERRY: Yes.

MR. KELLS: Mr. Chairman, I think we ought to have another field for the experiment station to work on.

MR. BERRY: Mr. Kells, my trees were making such an enormous growth and showing such an immense foliage up in the air, that I could not see where the benefit was for the tree to waste its energy on a limb that would eventually be six or seven feet long. I have cut that off in order not to waste its energy on the wood. I conceived that it would be better to cut that wood off and let it expend its energies on good fruit. So I cut the tops off four or five feet and let the sap go into the fruit. I attribute such fine fruit as I produce to my action.

MR. THOMAS: I saw the orchard, and it was the most remarkable crop of peaches I ever saw in my life. They would certainly have broken at the base. I will state right here, that as long as I have been in the fruit-growing business, that forty acres bears the largest crop I ever saw.

MR. BERRY: The fruit on the trees kept on growing. Their buds developed excellently. I never saw an orchard in better shape than it is to-day in regard to the development of fruit buds. They started on top, but did not grow on top any more, only about six or seven inches. The growth kept on spreading in this direction.

MR. LELONG: I will ask, in June pruning of the peach especially, have you observed wood that comes out after that and produces fruit buds? Isn't it a fact that the bud is produced on the new wood, and that that bud generally comes on the first shoot; that is, on the shoot made in the spring; and that by summer pruning or the June pruning, you get a willowy growth without fruit buds? Now, if these experiments are as I have stated, how are we to obtain fruit buds on this June growth for the next crop?

MR. BERRY: I could not answer that question.

MRS. JONES: I was about to ask how old these trees were, and if they continue to bear this phenomenal crop every year?

MR. BERRY: They are two years old.

MRS. JONES: Then you are simply experimenting?

MR. BERRY: I say I conceived that was the best plan to pursue with peach trees, arising from my observation in the orchard at Bakersfield. In consultation with a gentleman there, we decided among ourselves that all the orchardists of California, as far as we knew, were cutting their peach and prune trees too much. After that he purchased about one hundred acres of land in the vicinity of Hatch's place, and gave it to one of his sons. They have never pruned that orchard but once, and they make that statement.

MR. LELONG: I am well acquainted with the Treat orchard, at Biggs, having gone there every year since the first tree was planted in that section. I was looking into the question of lands before there was a tree planted there at all. This Treat orchard has been raised without any pruning, and alongside of it is the Hatch & Rock, the Hammon & Alexander, and Reed & Johnson orchards, and they prune. It seems that every one differs as to the method of pruning. The result has been that the Hatch & Rock orchard, for instance, is pruned very heavily. They have grown enormously large peaches, as large as Mr. Berry has said he sent to the State Board of Horticulture, and their trees are kept within the bounds of growth. The Reed & Johnson place is trimmed a little differently, and this year their fruit was so heavy on the trees that a great many of the trees broke, and fruit could not be shipped because there was a glut of fruit in the market, and nothing but good fruit could be shipped. Then, again, the Treat orchard, that is having no pruning at all, shows a marked difference. The growth is so luxuriant, that it takes the vitality away from the fruit, and the fruit will shrivel and dry on the tree. Go there now—it is a sight—you will find on each tree as many as a thousand peaches on the old wood, dried. They never developed. I think the experiment has illustrated the fact that these trees will have to be pruned or will have to be propped up.

RESOLUTION OF THANKS.

JUDGE TILDEN: I have a word to say, if it is in order. To-day, as we all know, the citizens of Los Angeles gave us a rare treat. We were invited to take a ride through the most beautiful country that I have visited for many a year. We were treated well. We had a pleasant ride and a safe return home, and, as we are about to part, I think it is proper to adopt a resolution, that this convention tender its thanks to our Chairman and the citizens of Los Angeles for the courtesies they have extended to us during the convention, and especially for this ride.

MR. BRAINARD, of the Committee on Resolutions, presented the following resolutions, which were unanimously adopted:

Resolved, That the thanks of this convention are especially due to the citizens of Los Angeles, through their Reception Committee, of which the Hon. G. J. Griffith is Chairman, for the most complete and well-arranged plans for the reception of the visiting fruit growers, and for the crowning effort for their pleasure in the way of a carriage excursion through the city of Los Angeles, Pasadena, and portions of the San Gabriel Valley, giving a view of the costly public buildings and beautiful residences, as well as the luxuriant groves of citrus trees, just now giving promise of an abundant harvest.

Resolved, That the thanks of the convention be tendered to the daily papers of Los Angeles, which have so faithfully and accurately reported the interesting proceedings of the sessions; to the California Club, for courtesies extended; to the Southern Pacific Company for a free excursion to Port Los Angeles, and the offer of greatly reduced rates for a trip to Indio; also to the Santa Fe Company for the tender of an excursion around the kite-shaped track, and also to the Mt. Lowe Mountain Railroad Company for the tender of an excursion over this remarkable road.

That to the Hon. Ellwood Cooper, who, in spite of feeble health, so ably performed the duties of President, we extend thanks; and to the two Vice-Presidents, Hon. Abbot Kinney and G. J. Griffith, thanks be also tendered for the able and courteous manner in which they discharged their duties as chairmen of the convention during the absence of President Cooper. Also, that the thanks of the convention are due to the Secretary, B. M. Lelong, and to the Assistant Secretaries, Rev. A. T. Perkins, of Alameda, and Mrs. Hattie S. Jones, of Sacramento, for their important services rendered.

MR. GRIFFITH (Chairman): The Chair thanks the convention very deeply for the compliment, I can assure you. However, I do not think the resolutions cover it all. I think that we have all been very much pleased, delighted, highly entertained, and have learned a great deal from papers that have been read. I think some of the gentlemen who have devoted so much time to the preparation of the papers that have been read here, deserve certainly the thanks of this convention. And, in view of the fact, I suggest that some gentleman move that a vote of thanks be tendered to those who have so ably presented their papers before this convention. I think some of them have been the ablest I have ever heard, and for that reason it is eminently due those gentlemen that we should not ignore them by any means.

MR. SPRAGUE: I move you that the thanks of the convention are due, and are hereby tendered, to those who have presented papers for the information and consideration of the convention.

This motion was seconded and unanimously adopted.

MR. BERWICK: If Berwick, of Monterey, has not tired you out already, gentlemen, I will thank you for the kind consideration of the papers we have given you, and I think you may hear again of the nationalization of railroads. [Laughter.]

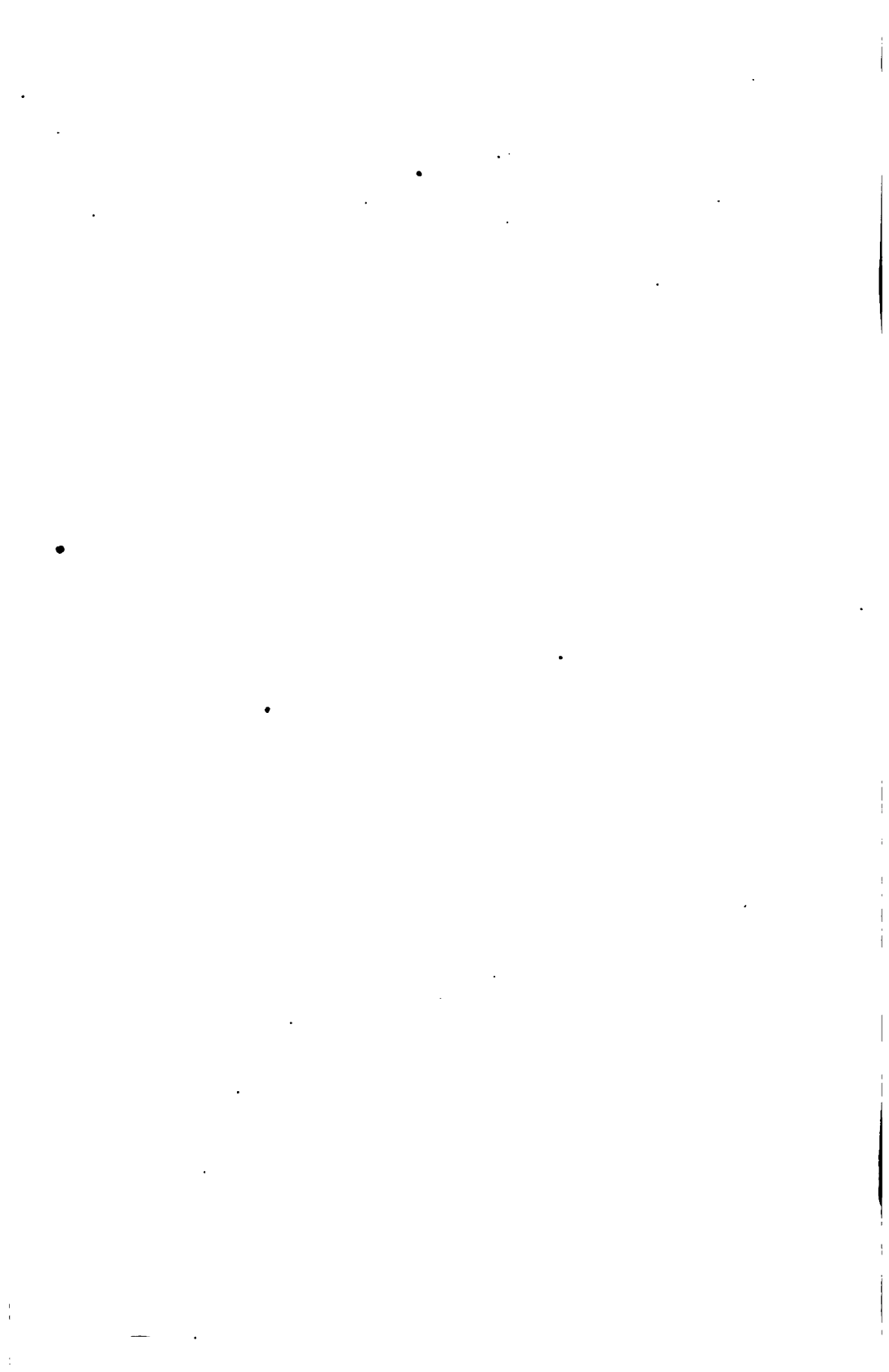
THE CHAIRMAN: The Chair would suggest that if there be nothing further, and as the hour is getting late, that it would be in order for the meeting to adjourn.

MR. LELONG: Before any such motion is put, I would like to say that I have attended a great many conventions in this State. In fact, ever

since 1884 I have had part of the management of all of them, and I have never met a more intelligent body of people, in convention assembled, than I have at this session. There has been more intelligent discussion and the best papers that I ever heard in my life have been read at this meeting. This is the index of our future work. I think when we meet at Sacramento, the people who read the proceedings of this meeting will come there and will make a similar effort, and I hope as many as can do so will attend that convention, because it will prove very profitable to them all.

MR. KELLS: Mr. Chairman, one more thing. I would like to call the attention of the convention, before we part, to one of the most important and most interesting subjects before the convention, and that is "coöperation." Let us not go home, after we have been so enthused over the matter of coöperation, and allow the matter to die on our hands, and wait until we meet again in 1894 and have to reconsider the work of coöperation. [Applause.]

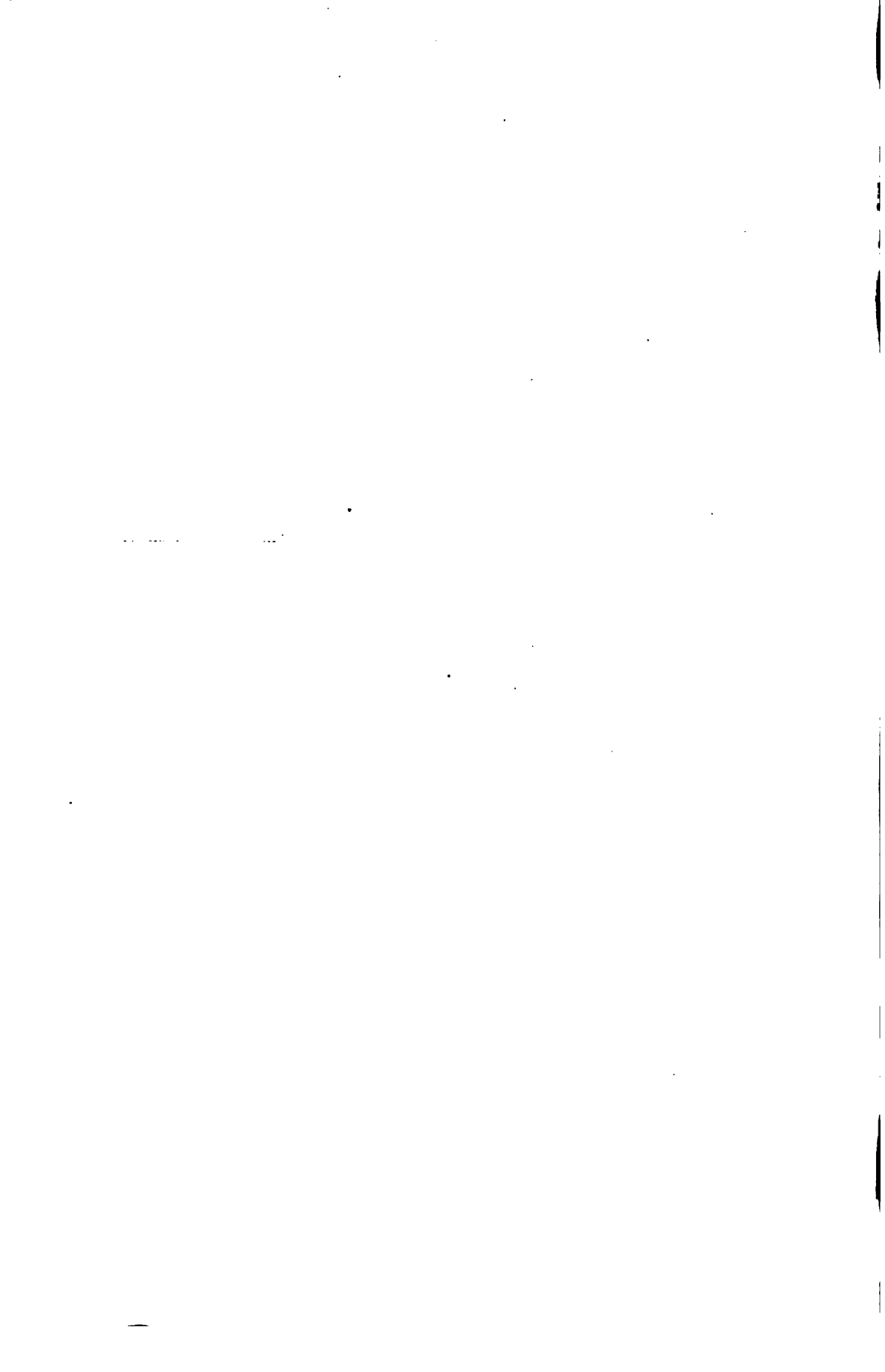
On motion of Judge Tilden, duly seconded and carried, the meeting adjourned *sine die*.



REPORTS

FROM

County Boards of Horticultural Commissioners.



REPORTS FROM COUNTY BOARDS OF HORTICULTURAL COMMISSIONERS.

Section 4 of Chapter CQLXV of the laws of 1889 provides: "It shall be the duty of said County Boards of Horticultural Commissioners to keep a record of their official doings, and to make a report to the State Board of Horticulture, on or before the first day of October of each year, of the condition of the fruit interests in their several districts, what is being done to eradicate insect pests, also as to disinfecting, and as to quarantine against insect pests and diseases, and as to carrying out of all laws relative to the greatest good of the fruit interest. Said Board shall publish said reports in bulletin form, or may incorporate so much of the same in their annual report as may be of general interest."

In 1892 only six reports were received, and these nearly at the end of the year, so that they could not be embodied in the annual report. In 1893 there was but one report filed on time (by G. W. Harney, of Marysville); the rest were filed much later.

Many of these County Boards lack system in making out their reports. Some have never had a meeting, and their report for the year is sent in the form of an individual letter, without the approval of the other Commissioners. Hereafter it would be well for all County Boards to call meetings to consider and approve their annual reports to be submitted to the State Board for publication.

ALAMEDA COUNTY.

To the State Board of Horticulture, San Francisco, Cal.:

GENTLEMEN: In conformity with the provisions of Section 4 of an Act entitled "An Act to protect and promote the horticultural interests of the State," approved March 19, 1889, relating to County Boards, I herewith respectfully submit my report as a member of the Board of Horticultural Commissioners of Alameda County.

During the past year I have visited all the orchards that were reported to me as being infested with insects injurious to fruit trees. I also visited places where I had reason to believe such insects existed. In all cases where I found insects pernicious to horticultural interests I ordered the trees disinfected.

There are several nursery establishments in my district which import trees and plants, and I paid a good deal of attention to these places. The result has been that the proprietors have learned to second my efforts, and have frequently asked me to call at their places during the year, especially during last spring and summer, when they were receiving and shipping many orders. I have not only visited these places when requested by these nursery establishments, but at various other times, when the proprietors did not expect my coming.

The colonies of insects introduced into the orchards of the State University by the officers of the State Board, to prey upon the injurious insects that from time to time get a foothold in said orchard, are beginning to do good work. I am watching them with some interest, and hope to soon see them spread to other orchards in this part of Alameda County.

The fruit interests of the county, as far as I can learn, have been very good this year. They have not been injured to any perceptible extent by the codlin moth.

Respectfully submitted.

TEMESCAL, October 31, 1893.

A. D. PRYAL,
President.

BUTTE COUNTY.

To the honorable State Board of Horticulture:

GENTLEMEN: The deciduous orchards of Butte County throughout the valley below Oroville, on both sides of the Feather River, that were infested with the scale *Aspidiotus perniciosus*, have been sprayed with the lime, sulphur, and salt remedy. Those that were sprayed in 1892 were not sprayed this last winter. The work was done in orchards that never had anything done in them before. I have not been in the mountains in my district to do any work, only to look around, and found only the soft brown scale on the oranges and the pernicious scale on the deciduous fruit trees. I hope soon to go among the owners of orchards and have them do something toward cleaning their trees.

The soft brown scale I find in all parts of the county that I have been in, and some trees in Oroville, Thermalito, Palermo, and vicinity, are very badly infested.

The yellow scale, in Oroville, has been sprayed with the rosin wash. First, the court-house grounds last spring, and this fall, in September, all the infested trees in the town were sprayed.

Have found the black scale on olive cuttings only three years old, and a number of blocks away from old olive trees that were infested, and find them in limited numbers in other yards about Oroville.

I will let Mr. Gray's report cover a part of mine, as our experiences have been similar in many ways, and will not take up your time in repetitions.

Nursery stock that has been raised in the county is as a rule very clean. Great pains have been taken to avoid shipping any trees with root knot. In some nurseries all the stock shipped was treated with hydrocyanic acid gas. There were received into the county from outside the State: One carload of assorted deciduous fruit trees, containing about 23,000 trees, from Oregon, and these were free from insect pests.

From Missouri, two carloads, with about 40,000 trees. The peach trees were infested with the Eastern peach borer (*Aegeria exitiosa*). These were quarantined and finally destroyed by burning.

One carload of about 9,000 orange trees, from Florida, infested with purple scale, were quarantined and gased and held until the eggs of the scale were all destroyed.

Four carloads of 4,000 orange trees, from Southern California, were received, infested with black scale. The trees were dipped in a solution

of whale-oil soap, as many of the trees had live scale upon them. These trees have been watched closely all summer, but I have not been able to find any live young black scale upon them.

One shipment of 200 orange trees, infested with purple scale, that had been received in another county and reshipped here, but which had not been disinfected, was quarantined and gased and held until clean.

A number of shipments of deciduous fruit trees were received, with certificates to the effect that the trees were free from root knot. Upon examination, however, I found a good many were infested with root knot.

Yours respectfully,

EBEN BOALT,
Horticultural Commissioner.

November 7, 1893.

To the honorable State Board of Horticulture:

GENTLEMEN: The pernicious scale is certainly on the decline, for many orchards in this section where no spraying has been done have less scale than formerly, and a large per cent seem to be dead, and if I am not mistaken they have been punctured by some enemy, but what I do not know. A few ladybirds have been found, but not in numbers sufficient to accomplish what has been done.

The codlin moth has not been active this year; as near as I can tell, not more than one fourth as bad as in former years. Some of the orchardists sprayed with Paris green, others did not. The red spider and yellow mite started in quite early on almond and French prune trees, but the cool summer and damp nights were not favorable to them, and the damage they did was light. On Rancho Chico two spraying outfits were operated nightly for two weeks, and killed a great many, but about the time operations ceased the scale began to disappear anyway.

According to your request at the last Horticultural Convention, I sent samples of pear blight to Washington, and in due time received a reply saying it was the genuine Eastern "pear blight"; but, unlike the blight in the East, it is not spreading. In orchards that had some of it two years ago, and where the affected parts of trees were cut out and burned, it has not appeared again. Some young trees that were black clear around the body have a new bark formed under the black bark; the latter flaked off, and the trees hung full of fruit this year.

We have a few grapevines of the Rose of Peru and Mission varieties which, without any apparent cause, when they had put out about eighteen inches of growth, and the first grapes were about the size of buck-shot, suddenly died. I dug down four feet, but could not find any trouble with the root. Some of these vines were twenty years old. Prof. Newton B. Pierce examined them last winter and did not think it was the same disease which they have had in the southern part of the State, and he could not find the cause.

The *Agaricus*, or root fungus, is doing a good deal of damage in some orchards, and I find very few know what is taking their trees in spots. I sent samples to Professor Pierce, and he came up here and spent a week examining the roots, and took samples of the fungus home with him to propagate, in order to find to what family it belonged. I am in hopes he will be able to report at our meeting at Los Angeles, and that a remedy may be found, for if it spreads, as it seems inclined to do, and no way of stopping it can be found, many tracts of good fruit land will

in time become unfit for tree raising. One of our orchardists, who is now preparing to set out a large orchard, is having his men follow up the oak roots to the end, if it be thirty feet, in order to prevent the fungus getting his fruit trees. Thus far I have not found pear trees affected, but peach, apricot, prune, and plum are liable to attack.

All of our nurseries are looking fine, and the proprietors are doing all they can to prevent the spread of insects, diseased trees, root knot, etc. They are all equipped for gasing their trees this winter. I have not found any scale on the orange trees of this part of the county.

Commissioner Boalt, of Palermo, will report for Oroville, Palermo, Gridley, and Biggs.

Yours truly,

G. M. GRAY.

CHICO, October 30, 1893.

HUMBOLDT COUNTY.

To the honorable State Board of Horticulture:

GENTLEMEN: I have the honor to submit herewith the annual report of the Board of Horticultural Commissioners of Humboldt County.

The orchards of this county have, during the past year, been inspected by local inspectors and members of the Board, and the general consensus of opinion is that trees are in a much better general condition than at this time last year.

The woolly aphid and oyster-bark scale (*Mytilaspis pomorum*) continue to be our most annoying pests, but judicious treatment is keeping them in bounds. The pernicious scale had made its appearance in various parts of the county and threatened to become a serious pest, but wherever the "lime, sulphur, and salt" spray has been faithfully applied it has been completely eradicated. Spraying with this preparation is quite general, though many prefer a solution of concentrated lye.

The present year has seen a remarkable increase in the acreage of new orchards, especially of apples and prunes. This county has much land admirably adapted to the growth of both of these fruits. The county is now producing and marketing a remarkably fine quality and rapidly increasing quantity of dried prunes and apples. A cannery has been for the past two seasons in successful operation in the Eel River Valley, and its presence has caused a large increase in the acreage devoted to peaches and small fruits.

The yield of apples, although light, is larger than last year, and the quality is unexcelled. We have no codlin moth, and we are doing our best to prevent its introduction.

On the whole, the fruit prospects of Humboldt County have brightened very materially during the past year, and it cannot be long until Humboldt County will be numbered among the more important of the fruit-producing counties.

All of which is respectfully submitted.

J. B. BARBER, President,
CARL C. MARSHALL, Secretary,
J. L. NOE,

Commissioners.

EUREKA, November 18, 1893.

KERN COUNTY.*To the California State Board of Horticulture:*

GENTLEMEN: We, the County Board of Kern County, respectfully submit to your honorable Board our report of the condition of orchards, etc., visited and examined by us.

We find that the San José scale is the only pest that has caused any damage to the fruit interests of our county. Of two hundred orchards examined we find ninety-three that are clean, and one hundred and seven that were infected with scale. Some are badly diseased, but on an average not nearly as bad as last year. Nursery stock has been in prime condition, and all young orchards are clean. We have caused all infected places to be sprayed with lime, sulphur, and salt, and find that when applied thoroughly this remedy has proved very effective, and we think that the scale is under control in this county; but it is impossible for the Board to make a clean sweep of the pests without the coöperation of all persons having infected places, as they can comply with the law and still breed scale, for, by not doing the spraying thoroughly, they do not kill all the scale and their eggs; and when the orchards are distributed over so much territory as is the case in Kern, the Commissioners cannot eradicate the pests except with the help of parties interested and the continual vigilance of the State Board.

Respectfully submitted.

BAKERSFIELD, September 29, 1893.

C. F. BENNETT,
Secretary.

LAKE COUNTY.*To the honorable State Board of Horticulture:*

GENTLEMEN: Samuel Graham, of Lower Lake, W. G. Young, of Kelseyville, and E. P. Wray, of Lakeport, constitute the County Board of Horticultural Commissioners of Lake County.

The Board met at Kelseyville, May 6, 1893, and organized by electing W. G. Young as President, and E. P. Wray, Secretary. E. P. Wray drew the three-year term, W. G. Young the two-year term, and S. Graham the one-year term. The county was divided into three sections, Mr. Graham taking charge of District No. 1, comprising Lower Lake and Middletown sections; Mr. Young, District No. 2, comprising the Kelseyville and Big Valley sections, and E. P. Wray taking District No. 3, comprising that portion of the county from Lakeport north, and the east side of the lake as far south as Paradise Valley.

As the season was so far advanced but little could be done in the way of fighting pests, and the work of the Commission has been directed to inspecting orchards and doing as much as possible toward educating fruit growers respecting pests. The orchards of Lake County have been remarkably free from insects in the past, and most growers are entirely ignorant regarding them. In the last few years several varieties have made their appearance and the war is upon us.

Mr. Graham reports finding numerous orchards in his section infested with woolly aphis, oyster-shell scale, and pernicious scale. Mr. Young reports the pernicious scale in his section and also the pear slug. Mr.

Wray reports the pernicious scale as infesting numerous orchards in Scott Valley and in Lakeport and vicinity. It is also found near Upper Lake. A species of green aphid infests several orchards in Scott Valley, and the red spider has been observed in several places, but seems to do no damage and has disappeared from some orchards. A species of canker worm made its appearance in great numbers in one pear orchard, but one spraying with Paris green was sufficient to exterminate the worm. The codlin moth infests the whole county. Several orchards in Scott Valley were sprayed with the lime, sulphur, and salt wash, early in the spring, and where done thoroughly has been effective in destroying the pernicious scale. Spraying with Paris green was effective in destroying the pear slug near Kelseyville.

So far the people seem willing to cooperate with the Board in the work of destroying pests, and but little opposition is experienced. It is expected that all infested orchards will be thoroughly sprayed at the proper season.

Planting of fruit trees still goes on, and many young orchards will come into bearing next year. The most successful fruits are the apple, pear, and prune. Peaches, apricots, figs, and oranges do well only in particular places.

Some orchards have lost many trees from sour sap, and a remedy for this disease is wanted. Many trees die down to the ground while the root remains in good condition and sends up a multitude of thrifty sprouts. So far it seems to be worse on warm soils than on heavy and wet land.

Respectfully submitted.

E. P. WRAY,
Secretary.

LOS ANGELES COUNTY.

To the honorable the State Board of Horticulture:

GENTLEMEN: The past year has not been encouraging to the fruit growers of this county. In many localities, especially along the foothills, much damage was done to the citrus crop by the heavy winds in December. Prices ruled low all through the season, and few if any of the growers had satisfactory returns. Deciduous fruits, with the exception of apricots, were a good crop, but prices have not been very satisfactory. The prospect for the coming orange crop is fair. Seedlings will be light, but budded varieties good and of fine quality.

During the last planting season I had to destroy many thousand trees affected with root knot, also a large number infested with borers. Importation of citrus stock from Florida has almost ceased.

Yellow scale has almost entirely disappeared in this county, except in the Downey and Rivera districts. Red scale in the neighborhood of Los Angeles City is dying out, apparently from the attack of a fungus. Black scale is still very troublesome; in fact, it has been worse this year than ever before.

There are a few orchards in Downey and Rivera in which some trees are infested with purple scale. These trees I am having cut back and fumigated, and hope to eradicate the pest in a very short time.

Pernicious scale is still with us, but has been almost entirely killed

out in most of the county. Frosted scale has increased during the past season. We are now spraying the infested trees, and hope to keep it in check.

During the past season upward of 40,000 citrus trees have been fumigated for the red and the black scale. There are at present about two hundred and fifty tents at work, also a large number of spraying outfits. I am in hopes that the *Rhizobius ventralis*, colonies of which have been sent to many orchardists by the Hon. Ellwood Cooper, will prove effective on the black scale. The *Orcus chalybeus* has increased in numbers to some extent, but not sufficiently to justify the removal of many for colonies.

Respectfully submitted.

JNO. SCOTT,
Horticultural Commissioner.

LOS ANGELES, September 30, 1893.

MENDOCINO COUNTY.

To the honorable State Board of Horticulture:

GENTLEMEN: We, the County Horticultural Commissioners of Mendocino County, beg leave to submit the following report:

We have divided the county into three districts, as follows: District No. 1 comprises all that section and territory known and described as follows: Beginning at the county line on the road from Cloverdale to Booneville, it includes all north and east of said road to the divide and west to the Pacific Ocean.

District No. 2 comprises all the southern and middle portions of Mendocino County not included in District No. 1, extending as far north as the headwaters of Russian River in the valleys, and to Mendocino City, and the coast.

District No. 3 includes all that portion of Mendocino County not included in Districts Nos. 1 and 2.

Mr. Leslie Hoag, of Booneville, has been assigned to District No. 1; Mr. L. U. Babcock has been assigned to District No. 2; Mr. Thomas B. Henley has been assigned to District No. 3.

In performing our duty of inspecting nursery stock brought into the county, we have placed in quarantine two lots of apple trees from Sonoma County that were infested with woolly aphis, and one lot of peach and apricot trees from Nebraska that were infested with the Eastern peach-root borer. These trees last named were destroyed by the Horticultural Commission.

In inspecting orchards we find the following named pests in various parts of the county, in numbers sufficient to be alarming: Pernicious scale, oyster-shell scale, greedy scale, woolly aphis, and codlin moth.

In endeavoring to eradicate the pernicious scale, and perhaps the most serious pest, it has been necessary to destroy about four thousand trees, mostly in District No. 2.

Nearly all of the badly infested orchards have been sprayed with the lime, sulphur, and salt wash, for the purpose of disinfecting them, and much of the work has been done in a thorough and workmanlike manner.

Horticulturists throughout the county are taking a lively interest in

destroying pests, and are seeing the necessity of doing so. With thorough and united action we believe these pests can be eradicated, or at least their ravages can be so checked that there need be no apprehension, but in this case "eternal vigilance" is the price of fruit.

We also find that the fruit industry is rapidly becoming an important one in this county. As near as we are able to estimate, the value of the fruit output of this county is at least \$15,000, and as yet very few of the young orchards have come into bearing.

We are able to report to you that the people are becoming convinced that the returns from land set to fruit are better than from any other use to which said lands can be put. In evidence we would submit the fact that there have been at least 50,000 trees set out in orchard during the past season, and we know that these trees are practically free from insect pests.

Respectfully submitted, by order of the Horticultural Commission.

L. U. BABCOCK,
Secretary.

UKIAH, October 1, 1893.

MONTEREY COUNTY.

To the honorable State Board of Horticulture:

GENTLEMEN: In accordance with law, I have the honor to submit the annual report of the Horticultural Commissioners of Monterey County, for the year 1893.

A great deal of interest in the way of planting orchards has been shown in the last four or five years, and this is destined to become one of the leading fruit-growing counties of the State.

The prominent feature of our county is its similarity, topographically, to the State. The great Salinas Valley extending from northwest to southeast through the center of its entire length, and the two mountain ranges on either side: the Santa Lucia range along the coast, with its numerous valleys and fertile hills, all abundantly watered and particularly adapted to the different fruits and berries, according to the difference of climate and soil; the Gabilan range, on the opposite side, equally rich and fertile in its greater portion, where every variety of fruit known in the State can be and is now being grown, in a limited degree.

We have in our county all degrees of temperature, from the cool winds and fogs of Pajaro and Salinas, by steps, as it were, to greater heat until we reach San Lucas and San Ardo—the Jolon Valley on the west, and Cholame Valley on the east, as we go south, with all the heat of the San Joaquin Valley.

Around Salinas and in the Carmel and Pajaro Valleys, the pear and apple arrive at a high state of perfection, and are almost entirely free from codlin moth, so destructive in other parts of the State. All the berries thrive in those localities, also, and much attention is being given to their cultivation. In these we find the oldest orchards, some planted many years ago, consisting of all the varieties of fruit grown in the State, showing what is peculiarly adapted to that locality. Many persons have started young orchards, improving on that experience.

The next in importance as a fruit country is the country lying between

Salinas and Pajaro, east of the latter, known as the San Miguel Cañon district, including Carneros. Here are orchards containing as high as fifty and sixty acres, from one to five years old, in a high state of cultivation and intelligently planted as regards adaptability to soil and climate. Prunes and apricots are extensively grown and reach a high degree of perfection. Peaches also do well. Other fruits average well, and are comparatively clear of all pests.

To the west, in the Carmel district, are some young orchards, which we failed to see, on account of the limited time allowed.

The next in importance is the Gonzales district, about eighteen miles south of Salinas, where we find some very fine orchards that are intelligently planted and cultivated. When we leave the river bottom, where there are fine apples, we find the prune, pear, peach, almond, and olive taking the lead, but all fruits are grown and are of fine quality, including the grape. At one small olive orchard of the Mission variety, some olive oil is manufactured.

In the Soledad and King City district, back in the valleys and hills, little attention is paid to fruit raising, but there are a few small orchards. The almond seems to be perfect, bearing heavily, while young, a fine, plump nut. The prune does well, and also all pitted fruits, judging from small orchards for family use which were visited.

In going from King City to San Lucas we find larger orchards and more attention being given to fruit, land being owned in small holdings, and all fruits promising well, especially almonds, prunes, and grapes. In the Jolon Valley and along its tributaries is a fine country, and prospects for the fruit industry are very flattering. Then as we cross the Salinas Valley to Cholame Valley, in its upper part we find some young orchards in which the stone fruits excel. The grape is destined to reach considerable importance in that portion of our county. A great deal of intelligence has been displayed in adapting the different kinds of fruit to the localities, the growers having based their judgment on the old orchards that were planted many years ago.

Considering the fact of there being no Commissioner or Inspector in the county until this year, and infested trees having been shipped all over the county at the will of nurserymen, we find the orchards wonderfully free from pests, yet their ravages are to be seen in all localities. Not having been appointed until late in the season, and the time allowed by the Supervisors being very limited, it has been impossible to do all that should have been done toward the destruction of pests.

In the old orchards in Pajaro and below Salinas we found the barklouse or oyster-shell scale, rose, and willow scale. In the neglected orchards they were very bad, as was also the woolly aphid. In some the pernicious scale was found, but not in any great numbers; also in Pajaro and Carneros country black scale, which infests many forest trees.

I forced the spraying with lime, sulphur, and salt, with good results. Nearly all the young orchards are comparatively clean, systematically planted, and cultivated in the most improved manner.

In the southern part of the county there is considerable trouble from borers, particularly where the trees were not well cut back.

Owing to the great heat of the sun and no means of irrigation, orchardists have to depend upon nature's moisture, properly aided by cultivation, to make trees live through the first year, after which they grow luxuriantly and bear abundantly.

As we approach nearer to Salinas the trouble grows less, and by the time we reach this vicinity we never hear of a borer, the summers being so cool and the air carrying so much moisture. The thermometer rarely indicates over 85° in the shade, while in the southern part of the county it often registers 110° and 115°.

Around Salinas we see but little signs of codlin moth, and in some orchards not a trace. Our greatest pest is woolly aphis.

There are about three thousand acres in fruit trees in the county, two thirds of which have been planted during the last five years. One fourth to one third of these trees are prunes: Of walnuts, the few trees in bearing promise well, being heavily loaded in this vicinity.

Respectfully submitted.

D. G. MACLEAN.

SALINAS CITY, November 4, 1893.

NEVADA COUNTY.

To the honorable State Board of Horticulture:

GENTLEMEN: In complying with the law in regard to the horticultural interests of Nevada County, I will state that there is a decided improvement in the condition of the orchards of this county. Having been all over the county, in the infected districts I find that the scale is not nearly as plentiful as it was last year. The people as a general thing comply with the law and do the best they can, and if interest increases in the next two years as it has in the last two years, the scale will be a thing of the past. Our principal pest is the pernicious scale. With the remedies at hand there is no trouble to get rid of all the fruit pests with a little work. There are some few persons who do not like to work, but I think they will fall in line soon. This is about all I can report in regard to insect pests.

Regarding imported trees, so far as I have seen they are all free from pests. The most of our young orchard trees are raised in this county. I find in my travels that orchardists are putting out a great many nut trees.

This report applies to all three districts. Hoping this will be satisfactory, I remain

Yours truly,

ANTHONY HOUSE, November 2, 1893.

JAMES R. VINEYARD,
Secretary.

To the honorable State Board of Horticulture:

GENTLEMEN: A report at this date is not so bright as I should like it to be; but scale is not as bad this season as it has been for some five or six years previous. There is something strange about it. Last summer the scale was bad all through the town of Grass Valley, and in some places on the outside. Many of the orchards were not sprayed, and this summer these trees are in better condition than many of those that were sprayed. I think, from the indications of this summer, that the scale will go. But it has killed hundreds of trees in this vicinity.

However, the trees generally are looking far better this summer than for years before.

There has not been much planting of trees in this section the past two years, and I doubt if many will be planted this season.

Fruits of all kinds are better and cleaner this season than they have been since the pest invaded this county.

Respectfully yours,

STEPHEN L. RICHARDS,
Commissioner.

GRASS VALLEY, November 2, 1893.

To the honorable State Board of Horticulture:

GENTLEMEN: I would respectfully report that I am trying my best to eradicate the scale, a labor which I find to be uphill work. Scale is not diminishing much in my immediate district. Most of the orchards here are small, comprising from six to twelve acres, and it is impossible to get all the owners to spray.

Most of the spraying done this season was with a patented preparation. There were thousands of pounds of it used in my district, and I pronounce it of no value.

Yours truly,

HENRY WATTERS,
Horticultural Commissioner.

NEVADA CITY, November 6, 1893.

ORANGE COUNTY.

To the honorable State Board of Horticulture:

GENTLEMEN: Orange County is one of the youngest and smallest counties in the State, having been organized but three years, and containing but seven hundred and fifty square miles.

Orange growing is the chief horticultural industry. Eight hundred carloads is the estimated output of the present season. This is equal to the entire crop of Southern California seven years ago. Although citrus fruits form the chief product of the county, every variety of fruit found in California is raised here with success. Walnuts are also a grand success. The raisin grape flourishes again as formerly. The growers of this county are now organizing five or six unions on a uniform plan to constitute one exchange, which will coöperate with like organizations throughout Southern California for mutual protection and benefit in marketing the crop.

For horticultural purposes this county is divided into three districts. One Commissioner is assigned to each district, and serves as his own inspector. The three form a Board for business, and, under the law of 1891, meet once a month at the county seat for business and consultation. It is the aim of this Board to execute the law as efficiently as possible, with the minimum cost to the county and without friction among the fruit growers. The time given by each Commissioner averages about five days per month, at \$3 per day, or \$15 per month. The entire cost to the county for the Board is less than \$600 per year.

It is customary for the members of this Board to visit each other occasionally between monthly meetings, for inspecting each others' methods and surroundings. Nine tenths of the fruit growers of this county need no pushing, but the other tenth (principally non-residents) require our attention. We find the law of 1891, as published in Bulletin No. 59 of the State Board, and the assistance of our County Attorney, all that we need to make our work easy and our duties pleasant.

Our enemies are legion, being almost every variety of *Aspidiotus*, *Lecanium*, and aphid; but our chief enemy is the red scale (*Aspidiotus aurantii*). Fifty thousand dollars a year would hardly cover the cost of the fight against this scale. We keep from forty to fifty tents in constant use, that cost on an average \$85 each, and to run them costs from \$3 to \$5 each per night, in labor and chemicals. Besides these, we keep in almost constant use eight or ten spraying outfits that cost from \$8 to \$12 per day.

We make all the use possible of parasites. For the cottony cushion scale the *Vedalia cardinalis* is all that could be desired. For the black scale we have lately received a few colonies of the *Rhizobius ventralis*, but cannot yet speak of their efficiency.

We find that each new pest added to our stock comes to stay; that no means of destruction at our command are adequate to its entire removal; that in spite of our best efforts at quarantine, new ones are being added to our list, and that our hope of success in this warfare must be in the introduction of beneficial insects and parasites. It is our opinion that our State authorities ought to keep one scientific and practical man constantly in the field in search of these friends to the fruit growers, and that the government at Washington ought to keep many such.

HIRAM HAMILTON,
B. J. PERRY,
I. N. RAFFERTY, Secretary,
Commissioners.

SANTA ANA, October, 1893.

PLACER COUNTY.

To the honorable State Board of Horticulture:

GENTLEMEN: The County Board of Horticultural Commissioners of Placer County beg leave to report as follows, for the season just past:

The Commissioners have been active and are pleased to state that the people have complied with the law very generally. We have had no trouble to get them to spray their fruit trees, and can say that beneficial results have followed. The scale pests are disappearing and very little codlin moth is to be found.

We destroyed one lot of prune trees, which we found infested with borers.

It was an oversight in not making a report on October 1st. We are all fruit raisers and were very busy in October.

Respectfully yours,

W. M. BAKER,
H. E. PARKER,
GEO. W. APPLGATE, Secretary,
Commissioners.

AUBURN, November 10, 1893.

RIVERSIDE COUNTY.

To the honorable State Board of Horticulture:

GENTLEMEN: The first report of the Board of Horticultural Commissioners of the new county of Riverside is respectfully submitted.

Riverside County was created by law in May, 1893, from the southern part of San Bernardino County and the northern part of San Diego County. The appointment of a Board of Horticultural Commissioners was one of the first acts of the Supervisors, as the fruit interests of this county were manifestly paramount. The personnel of the Board is as follows: Chairman, Judson House, of Riverside; Secretary, Charles W. Godfrey, of Moreno; Treasurer, George W. Van Kirk, of South Riverside. Each member of the Board assumed charge of a district, the county being divided into three parts.

The Supervisors passed a county ordinance more comprehensive than any existing State or county law touching horticultural interests. Twenty-two local inspectors were appointed, and a complete inspection of orchards was begun. The magnitude of the work has prevented its completion in time to make an itemized report at this writing.

The older orange trees are infested to a slight extent with the red scale (*Aspidiotus aurantii*) and cottony cushion scale (*Icerya purchasi*), and fumigating with hydrocyanic acid gas has been continually resorted to, with complete success. Soft brown scale (*Lecanium hesperidum*) and black scale (*Lecanium oleæ*) are less dangerous pests; they are treated with the usual washes.

A few of the older orchards of deciduous trees contain pernicious scale (*Aspidiotus perniciosus*), and the lime, salt, and sulphur wash is used. Isolated cases of red spider, pear slug, and woolly aphis have been found and fought with the usual remedies. As all the foregoing pests need but timely attention, their control is always possible.

The root knot affecting deciduous trees is attracting much attention, as its evils seem widespread and incurable. A frequent cause is extreme summer pruning, or loss of leaves by insects or blight, destroying the ability of the tree to assimilate the full amount of sap furnished by the roots. Another common cause is the result of budding slow growing plum and prune stock onto rapid growing peach root. The union is very imperfect, and a collar and crown knots are produced. This disease is at present incurable, although not contagious, and in exceptional cases affected trees have borne crops, yet by no means should young trees with root knot be planted. Bearing orchards may be so pruned while growing vigorously, or their cultivation so neglected, as to produce this trouble.

The orange industry of Riverside and vicinity is too well known to need elaboration now. The shipments for the season of 1892-3 were 2,525 carloads.

South Riverside has about 3,000 acres in citrus fruits, mostly oranges, though many lemons were planted this year. The water supply has recently been supplemented by the purchase of Lake Elsinore.

Moreno and Alessandro have 22,000 acres under the water of the Bear Valley system, and have planted 4,000 acres of young orchards, evenly divided between oranges and deciduous fruits.

San Jacinto has many fine pear and plum orchards in full bearing, with a total of about 3,000 acres. The Hemet tract is a well-watered body of

fine land now being put on the market. It will all be set to orchards eventually.

Banning contains 3,000 acres of orchards and vines, and raises fine deciduous fruits. Abundant water is obtained from the surrounding mountains.

Perris receives water from the Bear Valley system, and has 2,000 acres of citrus and deciduous fruits.

The Lakeview tract has recently been opened between San Jacinto and Perris. Artesian water has been developed from the subterranean bed of the San Jacinto River, sufficient to irrigate 3,000 acres, which will be planted to orchard next spring. It is estimated that 10,000 acres can be likewise supplied.

There are many scattering orchards about the county, but the places mentioned follow horticulture as their chief occupation.

The accompanying table shows the amount of planting during the past year:

	Citrus— Acres.	Deciduous— Acres.	Olives— Acres.	Total Acres.
Riverside	1,088	—	—	1,088
South Riverside	893	148	—	1,041
West Riverside	208	11	2	221
Alessandro	120	85	—	215
Moreno	775	772	183	1,730
Perris	100	295	20	415
San Jacinto	52	175	—	207
Banning	—	175	—	175
Miscellaneous	50	100	—	150
Totals	3,266	1,771	205	5,242

Total acreage planted during 1892-93, 5,242 acres.

This general report is submitted with regrets that the short time elapsed since organization prevents a more complete statement of resources and condition.

CHARLES W. GODFREY,
Secretary.

MORENO, November 8, 1893.

SAN BENTO COUNTY.

To the honorable State Board of Horticulture:

GENTLEMEN: I have no particular report of the work of the Horticultural Commissioners for the past season. We have watched closely all trees coming into the county for planting, and have found them clean with one exception; these we had thoroughly disinfected before planting, and they show no signs of scale at present.

We have found orchardists ready and willing, whenever we have discovered orchards infested with scale, to apply the remedies recommended, and the result is that orchards are much cleaner and in better condition than before the organization of the Board.

We shall start out next week to make our annual examination of orchards, and shall strongly urge upon those having apples and pears the necessity of applying the remedies recommended for the codlin moth,

as we have found from personal experience that from 75 to 95 per cent of fruit can be saved if properly and systematically sprayed.

We have no inspectors, as the orchard interests of our county are confined to a very small area, and we have not thought it necessary to appoint inspectors.

The names and addresses of the Board are: George S. Tremaine, San Juan, Secretary; E. W. Bowman, San Juan, President.

Respectfully submitted.

GEORGE S. TREMAINE,
Secretary.

SAN JUAN, December 8, 1893.

SAN BERNARDINO COUNTY.

To the honorable State Board of Horticulture:

GENTLEMEN: The work of the Board of Horticultural Commissioners of San Bernardino County has been chiefly of a routine character the past year. Some new insects have been found, but so far as observed have not been of a predaceous character. The formation of Riverside County removed from our jurisdiction a section to which we necessarily had to devote considerable attention.

Within the limits of the present county we have found that the black scale has spread and multiplied greatly the past year, especially in the western part. The twice-stabbed ladybird has been invariably found very numerous in the same localities, and there is abundant evidence that they have preyed extensively upon the *Lecanium oleæ*. Disinfection, both by gas and spraying would have been almost universally practiced had it not been for the statements made in reference to the *Rhizobius ventralis*, which had the effect of entirely stopping fumigation and largely the same effect with spraying.

Brown scale has not been more numerous than heretofore, which is rather surprising, considering the immense increase in acreage of citrus trees the past two years. Of red scale or yellow scale we have not a single tree known to be infested.

The large quantities of deciduous trees brought into the county for planting the past season showed a marked improvement in freedom from insect pests, a very small percentage showing traces of them. Notwithstanding this, everything was quarantined for examination, and disinfection rigidly enforced.

Root knot was found everywhere. In almost every consignment from the northern counties it was found, and thousands of trees condemned. The wisdom of the course pursued is well established, and from the fact that the growing season has developed the disease on large numbers of trees which showed no traces of it at planting time, raises a question with us whether we shall not quarantine absolutely nurseries in which the disease exists. Some such action forces itself upon us, for the reason that growers cannot afford annually to be subjected to such losses as have been theirs to bear the past two years from this cause. Thousands upon thousands of trees have been uprooted and found affected, and not a small number of the replantings as well.

The plantings the past year have been very large, and promise to be large for the coming season.

Respectfully submitted.

W. E. COLLINS,
Secretary.

ONTARIO, — — —, 1893.

SAN DIEGO COUNTY.

To the honorable State Board of Horticulture:

GENTLEMEN: We herewith submit a partial report of the condition of the fruit interests of the different districts of this county.

Originally the area of this county was about 14,500 square miles, but in the forming of Riverside County over one third of this territory was cut off, yet there remains 8,400 square miles, with a Board of three Commissioners, who were placed in charge of the horticultural interests of this large domain only last May, hence only a very imperfect report can be made, save from the records of other years.

The county embraces a great diversity of climate and soil, with equally diversified products. The present Board, during their first regular meeting, divided the county into three districts, Mr. W. R. Gunnis being given the first district, embracing the city of San Diego and suburban towns and adjacent valleys; Mr. H. Culbertson, of El Cajon, was placed over the second district, and Judson Williams, of Fallbrook, the third, the boundary lines being drawn with reference to the amount of orchards in each district. Mr. Gunnis was chosen President of the Board, and Judson Williams, Secretary.

Immediately after the organization of the Board two members of same were sent, under authority of the County Board of Supervisors, on a tour of inquiry and investigation through some of the adjoining counties, to learn the best methods of fighting insect pests. On the return of these Commissioners they recommended that the county procure fumigating outfits for each of the three districts, which was done, at a cost to the county of something over \$1,200, and a competent corps of inspectors set to work.

The warfare has been and is being waged against the pests with the utmost energy by means of the most improved fumigating appliances, the best washes and pumps, and the introduction of predaceous insects, the first of these insects being the *Vedalia cardinalis*, which in a few short weeks cleared about two hundred trees infested with cottony cushion scale. More recently the *Rhizobius ventralis* has been colonized in several orchards, but the time has been too short to give any reliable reports from it, though it was well demonstrated in the office in San Diego that the full-grown beetle works rapidly and feeds eagerly on the young black scale, the latter being placed in a candy jar where the *Rhizobius* were confined.

In some portions of the county the red spider is becoming one of the most serious of pests, especially to the lemon tree. This is not easily destroyed by hydrocyanic acid gas, but appears to yield to a treatment of sulphur, which may be blown onto the tree with a small bellows, or sifted on from a small bag made of burlap or grain sack.

The codlin moth has gained a foothold in some portions of the county, making it necessary to spray orchards with Paris green each year. But this pest has been kept out of our apple-growing districts, so that perhaps the apples grown in the Julian country and on the plateau of Smith's Mountain—each nearly a mile above sea-level—are as fine as are produced in the United States.

The pernicious scale is quite prevalent in portions of the county, but is being exterminated in some places by fumigating, and in others by some unknown cause, probably a parasite.

The county, through its Supervisors, is standing nobly by the Horticultural Commission in the suppression of these pests, and also in a rigid enforcement of quarantine ordinances. It has been necessary to seize and destroy many boxes of infected fruit and to fumigate hundreds of boxes from districts infested with codlin moth and various scale pests.

Our mountain districts are devoted largely to apple culture, but nearly all deciduous fruits thrive and produce the highest grades of fruit, while some of the valley districts, such as Cajon and Escondido, give preference to deciduous fruits, with good citrus orchards in lands a little elevated above the level of the valleys. On the mesa lands about Fallbrook citrus fruits and the olive take preference over all else, the olive being more extensively planted there, probably, than in any other district of similar area in the State, there being over 800 acres now growing within a few miles of the town of Fallbrook. Next in order comes the lemon, then the orange; yet this country, with the mesas and small valleys near Escondido, and in Bear Valley, produce apples only second to those of the mountain regions. In the district about San Diego Bay the lemon appears to find nearly or quite everything necessary for the production of perfect fruit, and hence it is being extensively planted, but not to the exclusion of the orange and deciduous fruits.

In this district a good deal of work has been done and we send a tabulated report as far as done, but which lacks much of being a full report of one district, though probably it will cover 90 per cent of the fruit trees in the territory. This must not be taken as an index of the county, for it probably contains over half of all the citrus trees in the county, while either of the other two districts probably contain twice as many deciduous trees, twice as many olive trees in at least one, and probably four times as many acres in grapes in either the second or third district, the output of raisins from El Cajon and contiguous valleys alone for the present season being over one hundred carloads.

Report (nearly complete) of District No. 1, of San Diego County.

Variety.	Number of Acres.			Plant of 1893.
	Bearing.	Non-bearing.	Total.	
Apple.....	91	33	124	10
Apricot.....	145	62	207	15
Cherry.....	.....	1	1	.....
Fig.....	90	38	128	20
Lemon.....	652	3,088	3,740	2,000
Orange.....	552	585	1,137	200
Olive.....	84	35	119	5
Pear.....	59	27	86	10
Peach.....	201	121	322	35
Prune and plum.....	66	84	150	50
Miscellaneous fruits.....	57	30	87	10
Grapes.....	350	.....	350	25
Nuts.....	5	21	26	10
Totals.....	2,352	4,123	6,475	2,390

Nursery stock (trees ready to plant) 1,500,000

Respectfully submitted.

FALLBROOK, — — —, 1893.

JUDSON WILLIAMS,
Secretary.

SANTA BARBARA COUNTY.

To the honorable State Board of Horticulture:

GENTLEMEN: I herewith forward to you my report of work as Horticultural Commissioner of Santa Barbara County, for the year ending September 30, 1893.

The year has been one of great activity among fruit growers and nurserymen. A much greater acreage has been set to trees than in any previous year. During the fall of 1892 the fruit crop was more than an average yield, and the fruit was less affected by insect pests than usual. This was due, in my opinion, to the more careful cultivation given to the soil, more thorough pruning, and a more liberal method of spraying; and the result proved to orchardists that spraying is beneficial, and, as a consequence, a much larger per cent of orchards has been brought under the operation of the spray pump the present year.

Deciduous trees have been subjected to Paris green; some having two or three applications, which remedied the codlin moth.

The larger citrus groves have been liberally treated to the rosin wash, *not once only*, but three or four times since January 1st. Two of these groves, of good extent (the trees twenty-five or thirty years old), were so badly infested with the red scale that I forbade the fruit being brought to market. Since then the trees have been sprayed four times, and are now looking vigorous. The fruit was picked while small and destroyed, thus giving the trees a fine new growth. I also placed a good sized colony of the *Orcus chalybeus* (which you sent me) in each of these two groves.

During last winter and spring nearly 75,000 olive trees were shipped from the nurseries in Montecito and Carpinteria to various parts of this county and to other parts of the State. I required all these to be thoroughly disinfected before shipment, and I personally inspected them; and I believe not one complaint was made by those to whom the trees were sent.

Several thousand citrus trees were sold from the same nurseries, and I believe but two parties have complained of any pests being found upon them.

The black scale often appears upon some orange and lemon trees within six months after planting, although I have personally inspected the same trees at the time of sale and pronounced them clean. I have had two or three such cases in my own garden.

During the year I have inspected more than 200,000 trees, shrubs, plants, flowers, and fruits. I have found the usual pests, such as woolly aphis, codlin moth, the black, red, and white scales, etc., but the *Vedalia* controls the white scale; Paris green and the rosin wash will subdue the aphis, the moth, and many of the other pests; and the *Rhizobius ventralis* and *Orcus Australasia* will divide the black scale between them.

Three or four years ago our fruit industry seemed threatened with destruction, and people from abroad were at a halt about buying land for tree planting. Now there is no hesitancy in setting out either deciduous or citrus orchards, as there is confidence in the remedial agencies at hand for any pests, if properly applied.

I have in two instances found what is called the "elephant beetle," specimens of which I gave to Dr. Lorenzo D. Yates, the President of our Horticultural Society. It is very destructive to citrus trees.

In conclusion, I will say that the prospect is encouraging for a greater number of permanent settlers desirous of entering into the fruit-growing industry than ever before; that the present actual fruit growers are more ready to improve their orchards and bring their fruits to a higher state of perfection. I have required all nurserymen and dealers in trees to demand of those from whom they purchase stock a certificate from the local inspector showing that the stock is clean.

Very respectfully,

T. N. SNOW,
Horticultural Commissioner for the First District.

SANTA BARBARA, October 31, 1893.

SANTA CLARA COUNTY.

To the honorable State Board of Horticulture:

GENTLEMEN: I have the honor of submitting to you my annual report for Santa Clara County.

The Board of Supervisors of my county appointed me Horticultural Commissioner on December 6, 1892. The county is so well known that I will not go into details in describing it. The leading industries are horticulture and viticulture.

My appointment occurred in planting season, and I was very careful not to allow any stock to be sold unless it was free from pests and fungi. I devoted four months to this work, during which time I destroyed over 2,000 trees.

In April the Supervisors limited my work to only ten days in the month for the remaining eight months. This time I spent investigating the several pests which are found in my county. The most prevalent one is the pernicious scale (*Aspidiotus perniciosus*), which once threatened to ruin our industry, but has now almost disappeared, the cause of which is a small chalcid fly (*Aphelinus fuscipennis*) and the twice-stabbed ladybird (*Chilocorus bivulnerus*). The black scale (*Lecanium oleæ*) and the brown apricot scale (*Lecanium armeniacum*) are both plentiful, but I am glad to report that the brown apricot scale has an enemy, *Comys bicolor*, a chalcid fly, which is doing remarkable work. In some of the districts fully one half, in some three fourths, are killed. As to the black scale, the twice-stabbed ladybird and Pilate's ladybird help to decrease it to some extent, but we expect better results from *Rhizobius ventralis*. The cottony cushion scale is a pest of the past, and only occurs in some gardens and on road trees.

These are the principal scale insects which trouble us. Other pests are the peach borer (*Sannania pacifica*), which has greatly decreased, owing to thorough fighting; the fall cankerworm (*Anisopteryx autumnata*), which exists in some parts of the county, which is due to bad attendance to the bands of printer's ink, not keeping them wet when the moths are hatching. The peach moth (*Anarsia lineatella*) does great damage to young trees, and, as I reported to Mr. Alexander Craw, it can be fought in December or January with kerosene emulsion. The larva is then in the crotch of the trees in minute burrows. The codlin moth (*Carpocapsa pomonella*) is a very serious pest with us; and we have

to fight it with arsenic washes and banding the trees, to secure a good crop of pears or apples. Now and then the flat-headed apple tree borer (*Chrysobothris memorata*) appears, but not alarmingly. The *Diabrotica* *soror* has decreased very much by its parasite (*Celatoria Crawii*). The cherry slug (*Selandria cerasi*) only occurs in some sections, and the damage is nominal. The prune aphid infests mostly young trees, and is easily fought. The woolly aphid (*Schizoneura lanigera*) occurs in some districts, and is kept in check by the more common ladybirds and lacewing flies. The red spider (*Tetranychus telarius*) is also here, and mostly infests the almond, spreading also to the prune and other trees. It occurs in numbers only in a dry season, and is not a serious pest with us.

In the vineyards the phylloxera has appeared, and infested vineyards are being uprooted.

Next to the insect pests, we have in the county several fungi, which do great damage to trees and fruit. The most prevalent ones are the pear scab, the shot-hole fungus, the curl leaf of the peach, and a new fungus on the apricot, which is not yet determined. All the fungi can be fought with success, and the only difficulty is in the preparation of the washes, which, unfortunately, only one out of ten can make properly.

On the whole, I can say that the pests of the horticultural and viticultural industries are on the decrease, owing to the thorough manner in which the growers spray their trees.

Respectfully submitted.

EDWARD M. EHRHORN,
Horticultural Commissioner.

SAN JOSÉ, November 1, 1893.

TEHAMA COUNTY.

To the honorable State Board of Horticulture:

GENTLEMEN: I herewith send you my report as Secretary of the Tehama County Board of Horticultural Commissioners, for the year ending September 30, 1893.

At the regular meeting of said Board E. Crotzer was elected Chairman, and G. H. Flourney Secretary. The county was divided into three districts, as follows: All that portion of the county north of Redbank Creek, on the west side of the Sacramento River, and all of that portion on the east side of said river north of Mill Creek, except Berendos, was designated as District No. 1, and President E. Crotzer placed in charge of the same. Berendos was designated as District No. 2, and Prof. O. E. Graves was placed in charge of said district. The remaining portion of the county was designated as District No. 3, and assigned to G. H. Flourney.

Many of the orchards and vineyards have been inspected, and in some of them pests have been found. The horticulturists all seem anxious to destroy all pests, but the Chinese, as a rule, are careless and neglectful. We intend to see that the law is rigidly enforced the coming winter.

Some of the orchards on Thomes Creek that were infested with scale several years since are now almost entirely clear of them.

The codlin moth is less destructive than in 1891 and 1892. Trees and vines planted the past season were clean, and have done well the past summer.

If the law were enforced half as well as the State Quarantine Officer seems desirous it should be, the horticulturists of Tehama County would have but little to fear from pests of any kind.

Respectfully submitted.

G. H. FLOURNOY,
Secretary.

HENLEYVILLE, 1893.

TULARE COUNTY.

To the honorable the State Board of Horticulture:

GENTLEMEN: I beg leave to hand your honorable Board my report for 1892 and 1893. During the planting season of December, January, and February last, I prohibited any trees from being planted in my district of Tulare County, unless they were sound both in root and top and entirely free from insect pests. I quarantined one lot of Winter Nelis pear trees (eleven hundred) affected with diseased roots, which lot was entirely destroyed by fire later on.

There was a nursery firm in our neighboring county of Fresno, that brought into that county two carloads of Eastern peach trees by procuring a certificate of inspection from one of that county's Horticultural Commissioners. Some of those trees were planted in the edge of our county. The affidavit accompanying the certificate stated that they were home-grown stock. I have marked the lots and the orchards and will keep posted on the outcome.

In my inspection of orchards last spring I found the brown-necked ladybird (*Scymnus marginicollis*) very numerous in some localities, and they seem to have cleaned the scale out pretty well. They have spread over a large area. It might be said with truth that Tulare County is comparatively free from the pernicious scale.

Orchards and vineyards were afflicted with cutworms very badly. Hand picking seemed to be the most effective remedy. It was my observance that wherever vineyards had been plowed in the fall and then again in the spring they were not troubled with cutworms, although others alongside of them not treated that way were.

We had the usual army of red spider to contend with. Sulphur applied properly and at the right time is most effectual.

The codlin moth has been bad in certain localities, but as the apple grower is now well informed about the remedy, I hope to hold the moth in check.

The *Lecanium hesperidum* scale appeared on some lemon trees, and specimens were sent to your office. The liquid spray material recommended by you was used and the scale disappeared.

The condition of our orchards and vineyards generally is very healthy and the crops produced were good ones, of most excellent quality. The fall season has been one of the best to produce well-ripened wood, and the prospects of another season's crop are unusually good. Number of trees in bearing, 231,732; non-bearing, 124,892. Number of acres in vines, 7,483. They are divided as follows:

Variety.	Bearing.	Non-Bearing.
Apple.....	6,402	2,380
Apricot.....	49,600	4,700
Cherry.....	100	300
Fig.....	1,800	2,700
Peach.....	92,000	54,000
Pear.....	10,140	7,160
Prune (French).....	42,000	28,000
Prune (other kinds).....	8,500	9,600
Lemon.....	540	6,960
Orange.....	2,900	8,412
Almond.....	750	700
Totals.....	231,732	124,892

Grapes.

Table.....	980
Raisin.....	6,208
Wine.....	315
Total.....	7,483

I have made the report of the entire county on acreage and trees. The trees are planted at irregular distances apart, and for that reason I have put down the number of trees and not acreage.

All of which is respectfully submitted.

VISALIA, November 1, 1893.

C. J. BERRY,
Horticultural Commissioner.

To the honorable State Board of Horticulture:

GENTLEMEN: Herewith please find my report as Horticultural Commissioner of Tule River District, Tulare County, for the year ending October 1, 1893.

During the early spring months I visited all the orchards in my district. I found on Tule River very few large orchards. A majority of the farmers have but few trees. Some of the old trees have pernicious scale. The owners of the large orchards in most cases complied with the law, but the small farmers neglected to do so, owing to the fact that they had no spray pumps at their disposal.

The Horticultural Society of Porterville, late in the season, bought a spraying outfit, which they propose to let the people use, and this year they will have no excuse for not spraying, and will be required to do so. I know of but one young orchard that has scale. The owner will thoroughly disinfect his trees in early spring.

The orange and lemon trees in my district are all free from insect pests, and are in a very healthy condition. There were planted in the neighborhood of Porterville 30,000 orange and lemon trees, all of which have made good growth.

At Lindsay, eight miles north of Porterville, there were planted 20,000 orange and lemon trees, which have done well.

I have inspected all trees that have come into my district, and have found them clean and in good condition.

Respectfully submitted.

PORTERVILLE, November 7, 1893.

R. H. McDONALD,
Horticultural Commissioner.

VENTURA COUNTY.

To the honorable State Board of Horticulture:

GENTLEMEN: We have the honor to submit our annual report of the condition of the fruit interests; what is being done to eradicate insect pests, etc., in Ventura County.

In a general way the fruit interests are in first-class condition. The county has a great variety of fruits of the finest quality, having received more awards in this line at the World's Columbian Exposition than any other county in the State.

We were fortunate in having a good county ordinance, and a well-organized Commission before any of the more serious citrus pests obtained a foothold in the county. A few citrus trees infested with red scale have been shipped or hauled into the county and planted, but they were discovered before the scale had spread to other trees, and were burned to ashes. We intend to treat all new pests in this way, at least until a parasite is found that will make them harmless. A local inspector lives within a few rods of each depot in the county, and consignees are required to notify the inspector within twenty-four hours of the arrival of trees, plants, fruit, etc.

Citrus trees in the Ojai and Sespe Valleys are almost entirely free from any kind of scale. Occasionally a little "soft brown scale" appears in a sickly condition, with two parasites feeding on them, viz.: *Encyrtus flavus* and *Coccophagus lecanii*. Nearer the coast citrus trees are infested with black scale, and at Ventura they are also infested with *Lecanium hemisphericum*. Several colonies of the new ladybird (*Rhizobius ventralis*) have been placed on these scales, and their progress will be reported next season.

We have just found some lemon trees infested with yellow scale (*Aspidiotus citrinus*) on both sides of Rincon Creek, which is the line between Santa Barbara and Ventura Counties. The infested trees are in an isolated location, and the scale has been there for some time without its parasite.

All kinds of deciduous fruits do well in this county, and many localities are entirely free from pests. Other localities have a great variety; the codlin moth, pernicious scale, woolly aphis, greedy scale, and red spider are all so well established in the county that we cannot hope to exterminate them. The codlin moth is slowly but surely spreading in several localities. Pernicious scale, greedy scale, and red spider are found in many places, but are kept down with the winter rosin wash. The woolly aphis is quite bad in some localities and hard to fight, many fruit growers preferring to dig up their infested trees. The vine disease did not make its appearance in this county, and what few vineyards we have are producing good crops of the finest grapes.

Respectfully submitted.

J. F. McINTYRE,
Secretary.

FILLMORE, September 30, 1893.

YOLO COUNTY.

To the honorable State Board of Horticulture:

GENTLEMEN: I beg herewith to present the following as my report for the year 1893:

In the Capay district there are approximately 600,000 fruit trees, and I have examined 310,000 during the year.

In my district I found scale in several orchards, and recommended spraying. I find that the summer heat in this locality kills great numbers of all kinds of scale, and I do not think we would be in danger from these pests if we did nothing, but think it best, however, to take the safest plan and spray thoroughly.

Codlin moth I have found in all apple orchards examined. I have recommended the use of Paris green. I have also advised the cutting down and burning of all old and diseased trees afflicted with other pests, as I find it impossible to do anything with them.

Pear slugs are very common, but we have checked them with Paris green. We are troubled greatly with twig borer on our young peach trees.

Root knot is quite prevalent on almond trees, and many have died from its effects.

Red spider is so common that many do not try to rid their orchards of this most injurious pest. Last summer I recommended, by your advice, the use of sulphur thrown on the trees with a common seed-sower. The good effects of this method are readily seen.

Last winter many trees died from sour sap. Almonds were more affected than any other kind. I have for the last three or four years been experimenting with this disease, and am now sure I have the remedy. The soil must not be plowed away from the roots, so as to expose them to the heat of the sun in the early spring. Last winter I had almond trees that stood for two weeks in eight inches of water, and not one died, but as soon as the water went down I banked the dirt twelve inches high around the body of the tree and left it remain there till the first of May.

No steps have been taken by this Board toward the regular inspection of young trees coming from California nurseries for planting, and we would like your advice on this matter.

I remain, very respectfully yours,

W. E. COLE,

Horticultural Commissioner.

CAPAY, November 4, 1893.

YUBA COUNTY.

To the honorable State Board of Horticulture:

GENTLEMEN: Since my last report I have proceeded with the work of inspecting and spraying the infested orange trees in the city of Marysville. Have visited on several occasions and have made inspections of the local nurseries, and I have found some little scale. I have called the owners' attention to it, and they promise to attend to it.

At Wheatland careful inspections were made, and I found growing several thousand deciduous trees in one of the nurseries with some signs

of the pernicious scale, and the owners promised to take steps to eradicate it, as they were anxious to have only clean stock.

While at Wheatland I appointed Mr. John King inspector for Wheatland and vicinity. He reports the finding of black scale on certain trees, and that he had notified the owners.

It will be quite necessary to maintain an inspector at Wheatland from the present time until the next planting season, as there are fears that importations of Eastern peach trees infested with the "yellows" may arrive at that station. It is the intention of the Horticultural Commissioners to watch with the utmost care every importation of Eastern trees and plants during the coming season, in order to prevent any new tree diseases from being brought into the county.

I have arranged to take care of any shipments that may arrive at the Marysville station, and the inspector appointed at Wheatland will look out for that station. Should more inspectors be required, I will appoint them. The orchards in the northern part of the county and in the Brown's Valley irrigation district that I recently inspected, I found free from injurious scale.

I find that notwithstanding the expensive and strenuous efforts that were made to rid the trees of the yellow scale, there are signs of it returning. I have, however, received assurances from the owners of infested trees that immediate attention will be given, and that the trees will be treated.

In that section of the county in the vicinity of Wheatland is the Colmena Colony. I made a series of careful inspections. There are now no signs whatever of scale insects in the Colmena orange groves, and I am to keep a careful watch over this district to prevent the yellow scale from securing a lodgment there. Near the town of Wheatland I inspected several orchards, and a nursery. On one side of the nursery there stands an orchard that is badly infested with the pernicious scale, which has already commenced to work its way into the nursery, two rows of the young trees being now slightly infested. With the exception of these two rows I find the nursery quite free from scale insects.

Official notices are in course of preparation to be forwarded to the owners of infested trees in and around Wheatland, and every effort will be made to induce them to take the proper steps to eradicate the destructive pests.

During the months of January and February (1893) particular attention was paid to the inspection of nursery stock. All the stock of trees in nurseries within the county and all importations of trees by rail or otherwise were carefully inspected. Special trips were made to Wheatland and Colmena Colony. Inspections of all deciduous trees placed on sale in the temporary sale yards in Marysville were made, and where no insect pests were found, certificates of inspection were granted. The citrus trees growing in the gardens and groves in Marysville were examined and many thousands of them sprayed with the rosin solution.

Inspection work in a Wheatland nursery resulted in the discovery of about one hundred slightly infested trees. These were destroyed. No scales were found at the Colmena Colony. In another nursery very slight traces of yellow scale were found. On notification, the owner promptly disinfected the trees with a rosin-soap solution. The yellow scale that once infested one of our nurseries is gradually disappearing, owing to efforts that have been put forth for its eradication.

Several lots of small citrus trees standing in nursery rows in the various yards in Marysville, and offered for sale, were found infested with the yellow scale. The owners were notified of the existence of the scale, and they promptly complied with a request to disinfect.

About one hundred bales, bundles, and boxes of trees, including a vast number of deciduous seedlings from France, and shipments from various nurseries throughout the State, arrived at the depot in Marysville during January and February. Many of the shipments were in transit to other counties, but a careful watch was kept in order to ascertain if any attempt was being made to import trees from the "yellows" infested districts in the Eastern States. After inspections had been made among the Marysville orange trees, notices were sent to the owners of the infested trees. As a result of the sending of this notice, many hundreds of trees were sprayed.

It gives me pleasure to report that there seems to be a growing desire on the part of the Marysville owners of citrus trees to rid them of the pestiferous "yellow scale" that has so long infested them.

During January and February the work consisted of inspection of all importations of trees that arrived at the depot in this city; inspections of citrus and deciduous fruit trees throughout the county and in the city of Marysville; special inspection work at the Wheatland nurseries through the Deputy Commissioner, J. King; inspection of all trees brought into the Brown's Valley district, and inspection and disinfection work at the Excelsior Water Company's orchard, near Smartsville.

During March and April about 7,500 olive trees and about 7,000 orange trees arrived at the Marysville railway depot. These trees were all inspected at the depot, in as complete a manner as it was possible to do without unwrapping them from the bundles in which they were shipped. Memoranda of their destination within the county were kept, and each lot was afterward thoroughly inspected at the place of planting, when taken from the wrappings.

Among the several lots of trees there were two lots found infested with scale; one, a mixed bundle of Florida orange and olive trees shipped through a nursery at Niles, was found to be infested with purple and black scales. The nursery was notified, and the shipment was withdrawn from Yuba County. The other lot consisted of some 3,500 orange trees from a nursery at Haywards. These trees were sent into Yuba County on the certificate of an inspector at Haywards, but when they were inspected were found to be infested with black scale. They were immediately quarantined, and the shipper notified. It was decided that the trees could be passed and allowed to be planted when they were properly disinfected. This was done by severely trimming the tops of the trees and dipping the trunks in a whale-oil soap solution, which operation was superintended by your Commissioner.

All the citrus trees in the city of Marysville were inspected and the work of spraying them was finished.

During March and April I visited and inspected the orange groves and orchards northeast of Marysville and the various new plantings in the Brown's Valley irrigation district. In those orchards and places where scale was found the proper remedies were given to the owners to be applied for the destruction of the pests. In an orchard northeast of Marysville traces of pernicious scale and signs of the codlin moth were found. Upon suggesting to the proprietor that the trees should be

sprayed, he gave orders to have the work done. A number of applications for recipes for manufacturing various washes to be applied as remedies for the destruction of scale on fruit trees were received at the Commissioners' office. These recipes were supplied in each case without any cost or charge of any kind to the county.

When the trees in the Wheatland nursery were being dug up for shipment it was necessary to have some one stationed there to see that the infested trees were not shipped out. Some 23,000 trees were looked over and about 1,500 were found to be infested. These were burned or otherwise destroyed, none but clean trees being sent out. All the orchardists whose places were infested were officially notified that it would be necessary to spray the trees, which they consented to do.

During May and June inspections were made of an importation of olive trees arriving at the depot in this city, the orange and deciduous orchards at the Colmena Colony, the orchards at the Olive Hill Colony, the newly planted trees at the Bernouli Swiss Colony, in the Brown's Valley irrigation district, and the nurseries and citrus trees in the city of Marysville.

Importations of olive trees were found in good order and free from scale. At Colmena Colony some traces of the soft orange scale were discovered on a few of the orange trees, but in such small quantities that it was easily destroyed. At Olive Hill Colony no signs of scale were discovered, but an incipient outbreak of the grasshopper pest was found to be well under control of the colony managers. The grasshoppers were of the devastating species, but they were not nearly so numerous as in former years; they were easily kept in check by the following remedy: One part, by weight, of arsenic; one part sugar to six parts bran; to which is added a sufficient quantity of water to make a wet mash. The mixing is done in tubs or half barrels. One of these is filled about three fourths full of dry bran, to which is added five pounds of arsenic (Paris green), which is thoroughly stirred through the dry bran with a wooden paddle or shovel. Five pounds of sugar is then dissolved in a pail of water, and this sugared water is mixed with the bran and arsenic, to which is added a sufficient quantity of water to moisten the whole. A teaspoonful of the mixture is placed near the root of each tree or vine. Allowing a teaspoonful of the mixture to each vine in an infested vineyard (the vines being set seven or eight feet apart), about ten pounds of bran, with arsenic and sugar in proportion, would be used, making the cost about 15 cents per acre. This mixture should not be put out where the domestic animals can have access to it, and great care should be used in handling it. The mixing should be done in a closed room, to prevent the flying about of the arsenic. Where it would not be safe to use the poisonous mixture the trees may be sprayed with the following preparation: One pound of buhach, three pounds of glucose, to ten gallons of water. The glucose should be first dissolved in hot water. This solution should be sprayed on the trees late at night, and when the locusts fall to the ground, stupefied by the mixture, they should be gathered up and destroyed. Many remedies have been tried from time to time, such as burning sulphur on the windward side of the orchard or vineyard; piling brush in the orchard and burning late at night, but none have proved so successful as the above mentioned. In the case of young vineyards, where the leaves have been eaten off, plowing under so that the vines are covered with a thin coating of earth, will save them.

In the course of three or four weeks they will send up new shoots. Covering the vines with paper bags has been tried, but in many instances the locusts have eaten through them.

The grasshopper in its native wilds is subject to the attacks of a tiny red insect or parasite, which by clinging to the grasshopper often retards its flight, and by sucking out its juices, kills it. In many of the specimens that I examined I found several of the parasites, and I believe that the work of this tiny red parasite has had the effect of preventing much destructive work by the grasshopper this year.

In July and August I visited the Olive Hill Colony, the Colmena Colony, the Smartsville district, also the orange trees and groves in the city of Marysville. At the Olive Hill Colony reports of the existence of scale on the trees at the McMillan place were brought to me, with the statement that the trees should probably be cut down and destroyed. A careful examination of branches taken from the infested trees showed that the trees were infested with the soft orange scale. I prescribed the proper remedy. My suggestions were carried out, and the trees are in good condition to-day. I also went through the groves at the Olive Hill Colony and carefully examined all the trees, but found no signs of any destructive insects.

In the Smartsville district I examined the trees in the town of Smartsville and those growing on the Bonanza ranch. I found some signs of the yellow scale at Smartsville, but the trees that I was called to particularly inspect were free from scale. The trees on the Bonanza ranch I found to be in a thrifty condition, with the exception of those that were quarantined in the early part of this year, on account of being infested with the black scale. These trees have not made satisfactory growth, which is attributable to the severe manner in which they were treated at the time they were taken from the nursery. The trees were completely rid of the black scale.

In the city of Marysville I made a series of careful inspections and found signs of the yellow scale returning, whereupon I issued a notice and forwarded a copy of the same to all owners of the badly infested trees.

The request contained in this notice was and is being generally complied with, which will have the effect of keeping the trees in good condition so far as the depredations of injurious insects are concerned.

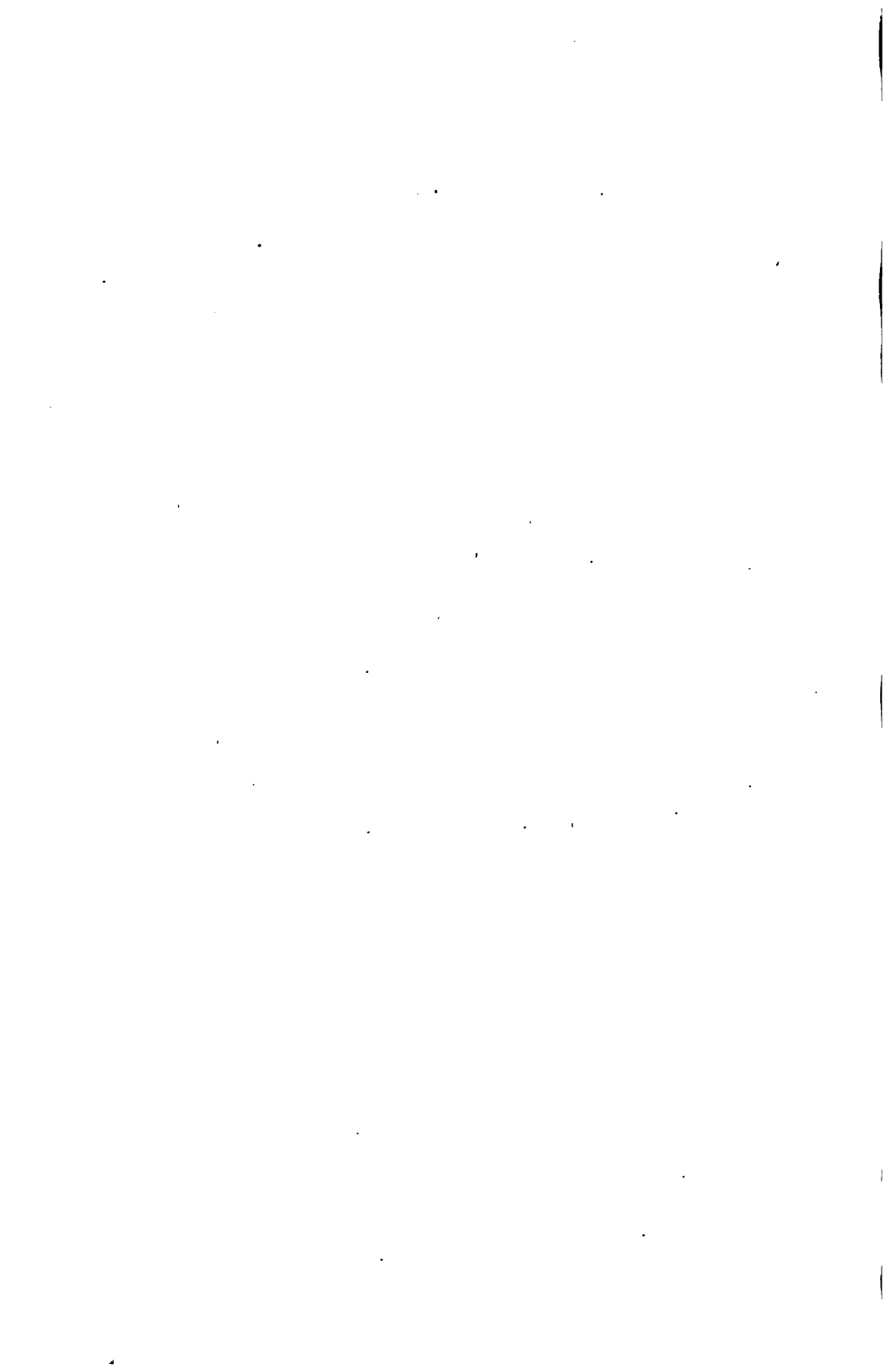
I also visited and made a number of inspections in the Wheatland district, examining by request the hop fields for aphids, none of which I found. The orchards in and around Wheatland are in a very clean and thrifty condition.

Respectfully,

G. W. HARNEY,
Horticultural Commissioner.

MARYSVILLE, September 1, 1893.

REPORT FOR 1894.



REPORT.

To his Excellency H. H. MARKHAM, Governor:

In accordance with law, we have the honor to submit herewith our report for the year 1894.

INSPECTION OF STEAMERS.

All steamers and sailing vessels that arrive at the port of San Francisco are boarded by an authorized officer, and all plants and trees found on them are carefully inspected, and when any are found infected with scale or any other insects injurious to fruit or fruit trees, they are immediately disinfected or destroyed. The following is a list of vessels that arrived at the port of San Francisco from January 1 to June 30, 1894, having plants and trees on board:

1894.	Vessels.	From—	Contents.	Disposition.
Jan. 1	Gaelic	China and Japan..	19 plants.....	3 destroyed.
Jan. 6	Columbia	Portland, Or.....	7 bundles trees	Clean.
Jan. 9	City of Sydney.....	Central America..	3 plants	Clean.
Jan. 12	City of Peking.....	China and Japan..	3 plants	Destroyed.
Jan. 12	Australia	Honolulu	35 packages trees	Disinfected.
Jan. 17	Columbia	Portland, Or.....	1 bundle trees	Clean.
Jan. 18	China	China and Japan..	152 cs. plants, bulbs	Plants fumigated.
Jan. 18	San Juan	Central America..	10 plants	Clean.
Jan. 20	Monowai	Australia	24 plants	Disinfected.
Jan. 26	Columbia	Portland, Or.....	1 bundle trees	Clean.
Jan. 27	Belgic	China and Japan..	54 cases plants	Fumigated.
Feb. 2	San Blas	Central America..	6 plants	Clean.
Feb. 7	Peru	China and Japan..	142 cases.....	Fumigated and others dipped, 120 destroyed.
Feb. 10	Australia	Honolulu	9 plants	Clean.
Feb. 16	Alameda	Australia	45 packages plants.....	Disinfected.
Feb. 20	San José	Central America..	5 cocoanut palms.....	Clean.
Feb. 22	Oceanic	China and Japan..	4 packages plants.....	Disinfected; 108 trees destroyed.
Feb. 27	Rio de Janeiro.....	China and Japan..	17 pkgs. plants.....	Disinfected.
Mar. 2	Acapulco	Central America..	3 palms	Clean.
Mar. 9	Gaelic	China and Japan..	36 cases plants.....	Fumigated.
Mar. 10	Australia	Honolulu	7 ferns	Clean.
Mar. 15	Mariposa	Australia	9 ferns	Clean.
Mar. 20	City of Peking.....	China and Japan..	15 cases plants.....	Fumigated; 16 plants destroyed.
Mar. 23	San Juan	Central America..	1 case orchids.....	Clean.
Apr. 1	China	China and Japan..	3 boxes plants	Disinfected; 4 plants destroyed.
Apr. 7	Australia	Honolulu	3 boxes plants	Disinfected.
Apr. 8	Belgic	China and Japan..	5 cases plants	Disinfected.
Apr. 17	Peru	China and Japan..	5 pkgs. plants	Disinfected.
Apr. 18	Monowai	Australia	2 boxes plants	Disinfected.
Apr. 18	San José	Central America..	2 coffee, 2 palm trees	Clean.
Apr. 28	Oceanic	China and Japan..	5 cases plants	Fumigated; 12 orange trees destroyed.
May 2	Acapulco	Central America..	3 boxes plants	Clean.
May 6	Australia	Honolulu	2 boxes plants	2 palms, 2 ferns with wax scale destroyed.
May 6	Rio de Janeiro.....	China and Japan..	13 pkgs. plants.....	Disinfected.
May 10	Alameda	Australia	3 pkgs. ferns	Clean.
May 15	San Blas	Central America..	3 ornamental plants.....	Clean.

1894.	Vessels.	From—	Contents.	Disposition.
May 21	Gaelic	China and Japan..	12 ornamental plants	Destroyed 6 ornamental plants and 2 orange trees.
May 27	City of Peking ..	China and Japan..	5 palms	Clean.
June 2	Australia	Honolulu	4 ornamental plants.	Destroyed.
June 4	China	China and Japan..	4 cases plants	Fumigated.
June 7	Mariposa	Australia	7 boxes ferns	Clean.
June 18	San José	Central America..	1 case orchids	Clean.
June 18	Belgie	China and Japan..	1 crate plants	23 plants destroyed.
June 30	Australia	Honolulu	7 palms	Disinfected.
June 30	Acapulco	Central America..	Banana plants and acacias.	Clean.

HORTICULTURAL QUARANTINE REGULATIONS.

At a meeting of the State Board of Horticulture, held in San Francisco, August 15, 1894, the following regulations were adopted, in accordance with the laws regulating such matters, and are therefore binding upon all persons:

REGULATIONS

Amending all existing regulations hitherto passed, and to take effect and be in force from and after August 15, 1894.

RULE I. All consignees, agents, or other person or persons, *shall*, within twenty-four (24) hours, notify the Quarantine Officer of the State Board of Horticulture, or a duly commissioned Quarantine Guardian, of the arrival of any trees, plants, buds, or cions at any point of debarkation in the State of California.

RULE II. All trees, plants, cuttings, grafts, buds, or cions, imported or brought into the State from any foreign country, or from any of the United States or Territories, are hereby required to be disinfected, as hereinafter provided, upon arrival at any point where they are to be unloaded; and furthermore, if any of said trees, plants, cuttings, grafts, buds, or cions are found infested with insects, or with any fungi, blight, or other disease injurious to fruit or to fruit trees, or to other trees or plants, they *shall* remain in quarantine fourteen (14) days, or until the Quarantine Officer of the State Board of Horticulture, or a duly commissioned Quarantine Guardian, can determine whether the said trees, plants, cuttings, grafts, buds, or cions are free from live injurious insect pests, or their eggs, larvæ, or pupæ, *before* they can be offered for sale, gift, distribution, or transportation.

RULE III. All trees, plants, cuttings, grafts, buds, or cions infested with any insects, fungi, blight, or other diseases known to be injurious to fruit or to fruit trees, or to other trees or plants, and liable to spread contagion, *are* hereby required to be disinfected before being offered for sale, gift, removal, distribution, or transportation.

RULE IV. All peach, nectarine, apricot, plum, or almond trees, and all other trees budded or grafted upon peach stocks or roots, all peach or other pits, and all peach, nectarine, apricot, plum, or almond cuttings, buds, or cions, raised or grown in a district where the "peach yellows" or the "peach rosette" are known to exist, *are* hereby prohibited from being planted or offered for sale, gift, or distribution within the State of California.

RULE V. All trees, plants, cuttings, grafts, buds, cions, seeds, or pits arriving from any foreign country, found infested with insect pests or their eggs, larvæ, or pupæ, or with fungi, or other disease or diseases hitherto unknown in this State, *are* hereby prohibited from landing.

RULE VI. Fruit of any kind grown in any foreign country, or in any of the United States or Territories, found infested with any insect or insects, or with any fungi, blight, or other disease or diseases, injurious to fruit or to fruit trees, or to other trees or plants, *is* hereby prohibited from being offered for sale, gift, or distribution within the State.

RULE VII. Transportable material of any kind, infested by any insect or insects, or their eggs, larvæ, or pupæ, or by any fungi, blight, or other disease or diseases known to be injurious to fruit or to fruit trees, or to other trees or plants, and liable to spread contagion, *is* hereby prohibited from being offered for sale, gift, distribution, or transportation, until said material has been disinfected by dipping it in boiling water and allowing it to remain in said boiling water not less than two minutes; such boiling water used as such disinfectant to contain in solution one pound of concentrated potash to each and every ten gallons of water.

RULE VIII. All trees, plants, cuttings, grafts, buds, or cions may be disinfected by dipping in a solution of three fourths of a pound of whale-oil soap (80 per cent) to each and every gallon of water; said whale-oil soap solution *shall* be kept at a temperature of 100° to 115°. Said trees, plants, cuttings, grafts, buds, or cions shall remain in said solution not less than two minutes. After said trees, plants, cuttings, grafts, buds, or cions have been disinfected they *shall* remain in quarantine fourteen (14) days for subsequent inspection, and if deemed necessary by the Quarantine Officer of the State Board of Horticulture, or a duly commissioned Quarantine Guardian, for further disinfection.

RULE IX. All trees, plants, cuttings, grafts, buds, or cions may be disinfected by fumigation with hydrocyanic acid gas, as follows: Said trees, plants, cuttings, grafts, buds, or cions *shall* be covered with an air-tight tent or box, and for each and every one hundred cubic feet of space therein, two thirds of an ounce of C. P. cyanide of potassium (98 per cent), one fluid ounce of sulphuric acid, and two fluid ounces of water shall be used. The cyanide of potassium shall be placed in an earthenware vessel, the water poured over the said cyanide of potassium, afterwards adding the sulphuric acid, and the tent or box to be immediately closed tightly, and allowed to remain closed for not less than forty minutes. After said trees, plants, cuttings, grafts, buds, or cions have been treated with hydrocyanic acid gas, as above directed, they *shall* remain in quarantine for fourteen (14) days for subsequent inspection, and if deemed necessary by a member of the State Board of Horticulture, or the Quarantine Officer of said Board, or a duly commissioned Quarantine Guardian, for subsequent disinfection.

RULE X. All trees, plants, cuttings, grafts, buds, or cions imported or brought into this State *shall* be inspected upon arrival at first point of debarkation, and if found infested with mining scales (*Chionaspis biclavis*) or other injurious insects which cannot be destroyed by the remedies required in Rules VIII and IX of these regulations, *are* hereby prohibited from being planted or offered for sale, gift, or distribution, and shall be proceeded against as a nuisance.

RULE XI. Any person or persons having in their possession trees, plants, cuttings, grafts, buds, cions, seeds, or pits infested with any insect or insects, or with any fungi, blight, or other disease or diseases injurious to fruit or to fruit trees, or to other trees or plants, and who refuse or neglect to disinfect the said trees, plants, cuttings, grafts, buds, cions, seeds, or pits, as is required by Rules VIII and IX of these regulations, after having been notified to do so by a member of the State Board of Horticulture, the Quarantine Officer of said Board, or a duly commissioned Quarantine Guardian, the said trees, plants, cuttings, grafts, buds, cions, seeds, or pits shall be declared a public nuisance, and shall be proceeded against as provided for by law.

RULE XII. Animals known as flying-fox, Australian or English wild rabbit, or other animals or birds detrimental to fruit or fruit trees, plants, etc., *are prohibited* from being brought or landed in this State, and if landed they *shall* be destroyed.

Passed at a regular meeting of the State Board of Horticulture, at San Francisco, California, August 15, A. D. 1894.

FINANCIAL STATEMENT.

The following are the expenditures incurred during the forty-fifth fiscal year, ending June 30, 1894:

Stenographer.....	\$306 25
Office furniture.....	91 90
Papers.....	31 10
Library.....	86 50
Janitor.....	236 80
Postage.....	395 75
Cartage.....	61 05
Freight.....	18 13
Wood-cuts and electrotypes.....	436 74
Lithographing.....	150 00
Miscellaneous printing.....	169 90
Traveling expenses of Commissioners.....	628 85
Salaries of Special Agents.....	894 50
Traveling expenses of Special Agents.....	91 25
Traveling expenses of Quarantine Officer.....	375 10
Traveling expenses of Deputy Quarantine Officer.....	20 40
Traveling expenses of Secretary.....	200 45
Salary of Deputy Quarantine Officer.....	69 00
Sketches and drawings.....	561 82
Office supplies.....	156 72
Rent.....	1,645 00
Repairs.....	23 40
Expressage.....	117 40
Experimenting.....	576 72

Midwinter Fair exhibit	\$2,077 11
Sundries	193 40
Seventeenth State Fruit Growers' Convention	183 35
Telegrams and telephone	203 55
Total	\$9,999 99

Very respectfully,

ELLWOOD COOPER,
L. W. BUCK,
FRANK A. KIMBALL,
J. L. MOSHER,
A. BLOCK,
FRED C. MILES,
SOL. RUNYON,
I. H. THOMAS,
A. F. WHITE,
Commissioners.

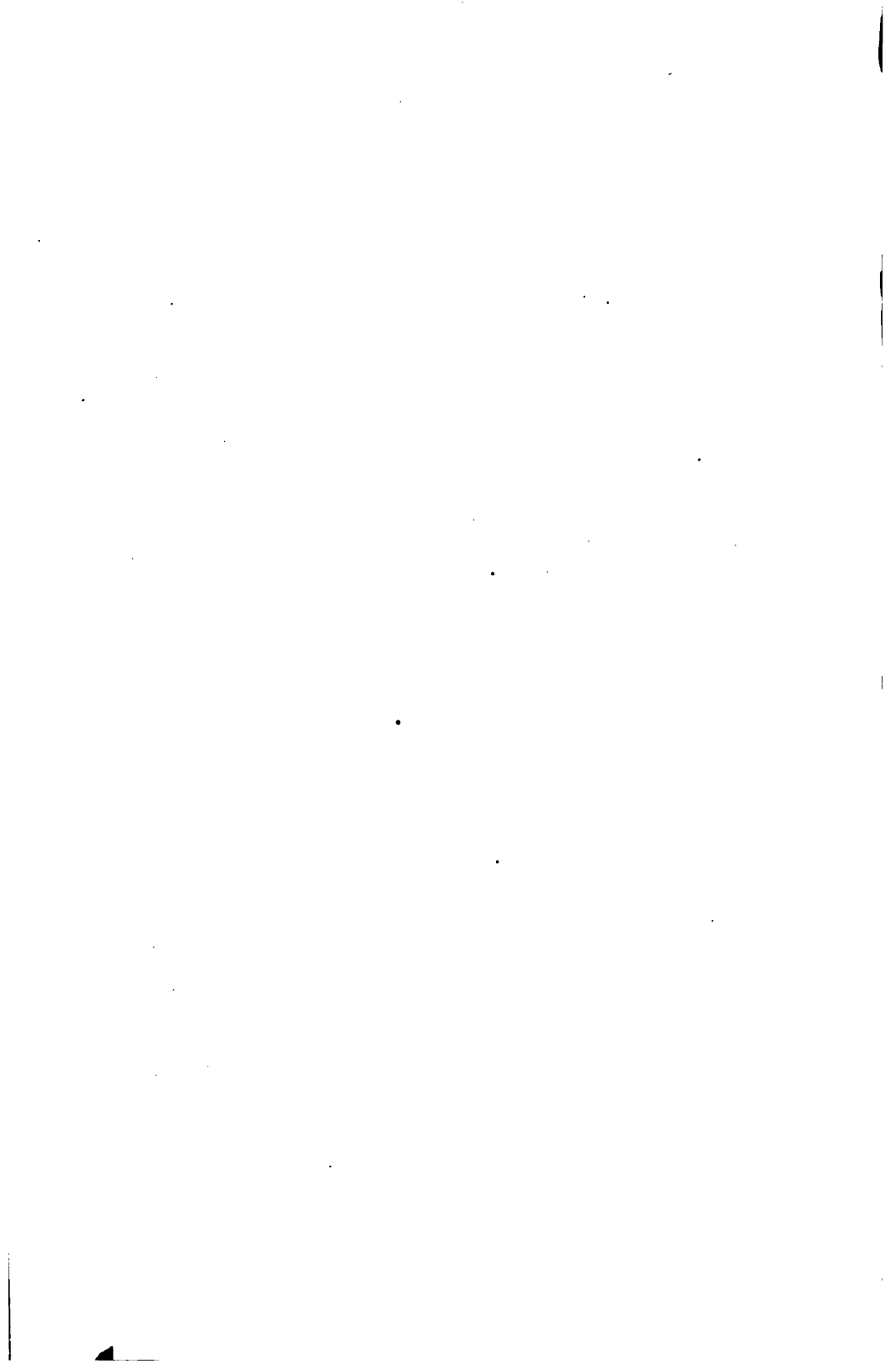
B. M. LELONG,
Secretary, and Chief Horticultural Officer.

Subscribed and sworn to before me, at San Francisco, Cal., September
18, 1894.
[SEAL.]

DANIEL HANLON,
Notary Public.

REPORT
OF
B. M. LELONG,

Secretary, and Chief Horticultural Officer.



REPORT OF B. M. LELONG,

Secretary, and Chief Horticultural Officer.

REVIEW OF THE FRUIT SEASON, 1894.

The present fruit season has been one of mixed good and ill. It opened with excellent promise. In many localities varieties have suffered from climatic or other causes, but on the whole the season can be reported as prosperous. Taking the State as a whole, the fruit crop may be said to be generally large in yield, while the quality is above the average. Prunes are the only fruit that will fall below the average in the State, although the large area of new orchards which are coming into bearing will bring up the crop to within 30 per cent of the usual annual output.

THE ORANGE CROP.

The most serious setback in the fruit season occurred on January 6th, when a severe frost swept over the citrus section of Southern California, damaging the greater part of the crop and very materially affecting the price of such fruit as escaped uninjured. The freeze did not come unannounced, and was anxiously looked for by the growers, who noted the dropping of the mercury with the keenest apprehension. By ten o'clock on the evening of the 6th the mercury at Riverside had dropped to the freezing point and was still slowly falling. The danger line had been reached, but when at midnight the temperature remained stationary for some time and then rose several degrees, it was hoped that the worst was passed. The orchardists who were anxiously watching the fate of their crops were doomed to disappointment, however, for at two o'clock the mercury had dropped to 24° and before morning had fallen even lower. Every effort to save the crop was made. Some orchards were flooded in order that the evaporation might overcome the low temperature; in others, fires had been kindled, and various other devices were resorted to to rescue some portions of the crop from the threatening danger, but in spite of all efforts the injury was very severe, the loss in San Bernardino and Riverside Counties alone footing up nearly half a million dollars. Sections which had previously been regarded as absolutely free from danger in this regard were caught and their crops injured. It was at first thought that the loss would foot up 75 per cent or even more, but subsequent developments showed these estimates as greatly over the mark, and as nearly as can be ascertained the total direct loss did not exceed 20 per cent. There was, however, an indirect loss, which fell heavily upon the growers. The report had gone abroad that the entire orange crop was ruined, and when Southern California oranges appeared in the market they were regarded with suspicion, and really good fruit was sold in direct competition with that which had been frosted and which was forced upon the market by unscrupulous shippers, to whom the immediate dollar was of more importance than

their own reputation or that of the section in which they lived. The result of this was that fruit injured and uninjured, alike, brought very low figures, and in many instances the growers' losses were very severe. The total output from Southern California was about 4,000 carloads—20 per cent below the shipments of 1892.

In the northern counties no damage was done by frost, and the yield was at least up to the average. This section is comparatively young in citrus production, the great bulk of this fruit growing south of the Tehachapi range. However, along the entire foothill belt of the Sierra Nevada range, aligning both the San Joaquin and the Sacramento Valleys, are very extensive tracts which are now being devoted to oranges, lemons, and other citrus fruits, and in the next few years the "Northern Citrus Belt" will become a very sharp competitor with the south for the Eastern citrus market. The total absence of frost in many of these sections has given a strong impetus to the industry, and already extensive Eastern shipments have been made from the "Northern Citrus Belt."

Another factor which militated against California's orange market in the East, and resulted in a depression of prices, was that the Florida season, which is usually over before California fruit reaches the market, was unusually late, and her fruit came in direct competition with that from this State. Florida, too, had an extraordinary large crop of fruit, and her growers were so anxious to dispose of it that they seemed willing to let their goods go at any figure which was offered. These causes combined have had a somewhat depressing effect upon the California orange grower. At the present writing, however, a better feeling prevails, the trees are setting heavily with fruit for next season's crop, and it is not probable that such a combination of causes will occur to depress the orange market again for some time at least.

The necessity for unanimity of action among the orange growers, in order that profitable returns for their product should be had, forced itself upon them some time since, and resulted in the organization of the Southern California Fruit Exchanges, and to this is largely due the fact that the growers of citrus fruit have been able to market their products this year without absolute loss. Considering all things—the frost, the financial depression, and the natural opposition of dealers—the Southern California Fruit Exchanges have made a most excellent record for the year.

The report of W. A. Perry, the manager of the Exchanges, is given below:

RIVERSIDE, CAL., June 12, 1894.

To the Officers and Members of the Riverside Fruit Exchange:

It is impossible to give a detailed statement of the affairs and conditions of the Exchange at this time. There have been shipped about 1,333 cars to date. There remains in Riverside about 40 carloads.

We have paid over to the various associations up to date, \$336,995 50. There are probably about 175 carloads that have been shipped yet to be accounted for, which should amount to \$46,600, which would amount to about \$383,595 50, with over 40 cars on hand.

Associations Nos. 3, 4, 5, 11, and 12 have shipped all their fruit for the season. The balance of 40 cars still remaining in Riverside will be shipped from Associations Nos. 6, 7, 8, 9, and 10. At the present rate of shipping, these 40 cars will all be forwarded within the next ten to fifteen days.

Up to the present time we have paid out on our brokerage account about \$25,000; on balance of expense account, \$14,000. Our brokerage and expense accounts include all expenses incurred, such as organization expenses, expenses of traveling men, Eastern representatives, brokerage, cash discounts, commissions paid auction houses in the East, commissions paid on rejected cars, also commission on all consigned cars, office expenses, office furniture, telegraphing, stationery, and in fact every expense connected with the

entire working of the Exchange. We have on hand about \$5,000 collected as a guarantee fund, which will probably be refunded to the various associations. We will have at the end of the season from \$3,000 to \$10,000 that has been collected from the various associations, and held in reserve to meet expenses, that will be refunded at the close of the season. At the close of the season we hope to furnish the growers a detailed statement showing the various items of expense, etc., for the entire season.

In the meantime, if any of the growers wish to obtain any further information from the office, or look over any of the accounts or books, we will take pleasure in giving them every facility and furnishing them with all possible information. I would like to have all growers feel that they have the privilege of calling upon us for such information, and believe all employes in the office will take pleasure in explaining all of the workings of the Exchange and all details and accounts as fully as possible.

Yours, respectfully,

W. A. PERRY.

In San Francisco the orange market was very dull. This was due largely to the fact that the greater part of the California fruit found its way here in the dull season after the holidays and after the cold snap in the south. The ruling prices for the season are given herewith:

	Navels, per Box.	Seedlings, per Box.	Tanglerines, per Box.
January 6.....	\$2 25@2 50	\$1 00@1 50	\$0 75@1 00
January 13.....	2 02@1 75	1 15@1 25	75@1 00
January 20.....	1 25@1 90	75@1 25	65@1 00
January 27.....	1 15@2 00	75@1 15	65@ 90
February 3.....	1 25@2 00	75@1 25	65@1 00
February 10.....	1 25@2 00	75@1 25	65@ 90
February 17.....	1 00@2 00	75@1 00	65@ 90
February 24.....	1 00@1 85	75@1 00	65@ 90
March 3.....	1 00@1 75	50@1 25	50@ 75
March 10.....	1 50@2 00	75@1 00	50@ 75
March 17.....	1 00@2 00	75@1 25	40@ 50
March 24.....	1 25@2 25	1 00@1 25	40@ 50
March 31.....	1 50@2 35	1 10@1 75	-----
April 7.....	1 50@2 35	1 00@1 75	-----
April 14.....	1 35@2 50	1 00@1 50	-----
April 21.....	1 35@3 00	1 00@1 50	-----
April 28.....	1 50@3 50	1 00@2 00	-----
May 5.....	1 50@3 25	1 00@2 00	-----
May 12.....	1 50@2 50	1 00@1 50	-----
May 19.....	1 50@2 50	1 00@1 50	-----
May 26.....	1 50@2 50	1 00@1 50	-----
June 2.....	1 50@2 50	1 00@1 50	-----
June 9.....	1 25@2 50	75@1 25	-----
June 16.....	1 25@2 50	75@1 25	-----
June 23.....	1 25@1 75	75@1 25	1 25@1 75
June 30.....	1 25@1 75	75@1 25	1 25@1 75
July 7.....	1 25@1 75	75@1 25	1 25@1 75
July 14.....	-----	-----	-----

CHERRIES.

The cherry season opened with rare promise; the trees were heavily loaded with bloom, and the fruit set well; but the extraordinarily heavy rains which fell during May and in the early part of June did a great amount of damage in the cherry districts, although the output of fruit was still large. The rains which came during the picking season hindered the gathering of the crop, and much of the fruit had to be left until it was overripe and unfit for market. The keeping qualities of the fruit were also impaired by the rain, and much that found its way to market was either spoiled or in a very inferior condition. As a result, prices were very low, dropping to 2 cents, and many growers realized but little more than the cost of picking their fruit. Some of the later

fruit came through in better condition, and prices advanced to 4 cents for Royal Anns and 2½ cents for mixed black and Royal Anns.

While the value of the crop was very largely impaired by the inopportune rains, the yield was large and the amount of money brought into the State was very considerable. Large shipments were made to Northern and Eastern points, principal among which were, north: Seattle, Tacoma, and Portland; east: Ogden, Salt Lake, Denver, Minneapolis, and St. Louis; south: Los Angeles, San Diego, El Paso, Prescott, and New Orleans. Eastern sales of good shipping varieties were satisfactory, those which sold at low figures being in bad condition. Many lots sold at from \$1 75 to \$2 10. At \$2 per box in Chicago the grower would net 14 cents per pound for his fruit on the tree, allowing for picking 1 cent per pound, box 5 cents, packing 5 cents, freight and loading 26 cents, and commission 7 per cent. At \$1 per box the grower would realize about 4.7 cents per pound. The average price of cherries in the Chicago market this season, or of those which arrived in good condition, was \$1 30 per box of ten pounds, which would net the grower 7.4 cents per pound for his fruit on the tree. At these figures cherry growing is profitable, even in view of the fact that the cherry tree is slow in coming into bearing. Of course, inferior watery varieties, as the Cleveland, Governor Wood, Rockport, etc., do not pay, as they cannot reach the market in good condition. In commenting upon this subject, the Fruit Exchange, in their bulletin, recommend as follows:

It is foolish to continue to cultivate trees with no hope of profit, and the obvious course to pursue is to graft over every tree of the non-profitable varieties into Black Tartarian, Royal Ann, Black Republican, or other good carrying cherries of those types. With this done, let the grower learn the precise stage in which to pick them, pack carefully in well-seasoned and well-ventilated boxes, arrange for prompt and careful delivery to the cool car, under contract that it shall not be packed too full to permit free circulation, and put his trust in Providence. One year with another he will do well, and the world will look bright to him. Those who persist in raising unsuitable fruit, or sending good fruit poorly packed, or otherwise likely to arrive in bad order, will have no business to abuse "over-production," the "infernal auction system," the "thieving middleman," or anybody else outside their own family. We may some time deliver East more sound, ripe cherries of the best varieties than can be sold at a profit under present conditions, but we have never yet done so.

The demand for canning varieties was not so large as usual this season, the continued stringency in the money market and the unsettled condition of business causing the packers to move cautiously. The canners, however, consumed a very considerable portion of the crop in the latter part of the season.

San Leandro, Alameda County, is in the heart of the cherry district, some 500 acres in this vicinity being wholly devoted to the culture of this fruit. The trees run about 108 to the acre, and average 100 pounds of cherries to the tree. This would give a crop of 5,000,000 pounds at San Leandro, which was a very heavy sufferer from the heavy rains in the late spring.

Santa Clara County, the next important cherry section, suffered in a less degree. The fruit here was not in so advanced a state as in Alameda County, and therefore suffered less damage from the rains. Up to June 11th there had been shipped from San José 2,619,405 pounds of cherries, the shipments for the week ending with the above date being the heaviest recorded, amounting to 1,148,065 pounds, or forty-seven carloads.

In Sonoma County the early crop was almost totally destroyed, few if any shipments being made. The later varieties, however, escaped damage, and heavy shipments from Santa Rosa took place later in the season.

While the cherry growers and packers suffered from the heavy rainfall at this season, the downpour was a most providential one for the producers of other fruits and for the State in general. A drought of fifty days' duration, the longest in the annals of the State during the rainy season, had been broken. A most disastrous dry season had been anticipated, and all lines of business were suffering. Stock was offered almost at the buyers' price; hay was rapidly advancing in price beyond the reach of consumers, and even fruit growers, to whom periodical rains are not a necessity, began to be dubious about the result. In the latter part of April the rain came. It was copious from the Oregon line southward to Monterey and San Joaquin Counties, but the first rains were very light south of these points. However, sufficient rain fell in the mountains to insure water for irrigation, so it may be said that the fruit interests suffered very much less than any others from the long dry spell of last winter. The greater loss experienced was, as explained before, suffered by our cherry packers, who were caught by the heavy storms fairly in the midst of their busy season, and interfering seriously with the pack. Much, even of the fruit that was packed under the supposition that it was uninjured, was damaged, reached the market in very poor condition, and sold at low prices. The later varieties, which escaped the damaging rains, however, carried in excellent shape and netted good returns.

DAMAGE FROM THE STRIKE.

The prospects for a large demand and good prices for California fresh fruit were never better than at the opening of the present season. A very severe frost swept over the fruit sections of the Eastern States when the trees were in bloom. In many places the crop was totally destroyed, and in most localities very severely injured. In Georgia the freeze was very severe and the fruit crop was entirely destroyed. In Delaware at least 75 per cent of the peach crop was ruined, while the remaining 25 per cent was damaged. Not so much damage was inflicted upon New Jersey, which, nevertheless, suffered to some extent. Southern Illinois, Michigan, and Kentucky were also heavy sufferers. The apple crop was also badly damaged, and it was reported that there would be a shortage of 50 per cent in the entire fruit crop of the Eastern States affected by the freeze.

In view of these facts the California growers naturally expected a heavy demand and good prices for their fruits, but the late rains damaged the cherry crop, and when the apricots and early peaches were ready for shipment, the great strike, which tied up all the transcontinental lines, had been inaugurated, and our growers found themselves with large crops of fine fruit on hand and no means of reaching the market. As a result, the losses to our orchardists were very heavy, and, while it is not possible to obtain an accurate account of the amount, conservative estimates are to the effect that a million of dollars would not make the fruit growers of California whole from the effects of the strike. Reports received from the principal fruit centers while the strike was in progress were as follows:

SACRAMENTO.—Hale's Early peaches are rotting on the trees, and the loss from that source alone will run into thousands of dollars. Early plums, including Tragedy and other varieties, are already too ripe for shipment, and the probabilities now are that the crop will be a total loss. One half the Bartlett pear crop is now ripe enough for shipment, and in a few days it will not bear transportation. Growers say that if the strike

lasts another week the crop will be a total loss. Most of the fruit men are drying their apricots, and the loss in that fruit will not be large. The fruit men in this county have nothing to depend upon except the local market and the local cannery. The latter only takes fruit from day to day at its own prices, and as fruit is abundant it is compelled to reject the loads of many farmers. So far the cannery has gained rather than lost by the situation.

PLACER COUNTY.—The loss to the growers of Placer County up to the present time is about \$50,000. The estimated loss for each day at present is from 12 to 20 carloads, or from \$5,000 to \$10,000. The crop now ripening consists of all varieties of plums and the peach known as the Early Crawford, which is one of the staple varieties and very valuable to the producers. Bartlett pears are also about ready for shipment, and all of these varieties mentioned will be a total loss unless harvested in a very few days.

VACAVILLE DISTRICT.—The stoppage of fruit shipments from this point has had a very disastrous effect upon the fruit growers, and many small ones will be nearly ruined. Quite a number have nearly all the fruit they raised this year now in the blockades, and there is no prospect of realizing a cent. Several of the prominent growers and shippers say that the loss to Vacaville township now stands between \$50,000 and \$60,000. Should the strike continue two weeks more the amount will be quadrupled, as the town ships from thirty to seventy cars of fruit each week. Every fruit grower in Vacaville township has now turned his attention to drying. Apricots are easily disposed of in this manner; but here another difficulty has presented itself: Owing to the heavy demand for drying-trays, lumber suitable for that purpose is exhausted, and more cannot be had at any price. Peaches, prunes, and plums are also being dried, in hopes of getting something for them; but other fruit, grapes and pears, for which there is no demand in the dried state, are a total loss, as Vacaville township has no cannery.

FRESNO.—Fruit in boxes is rotting in warehouses, and more is rotting in orchards. Perhaps the loss to date is \$50,000. Buyers will no longer engage fruit, sales are being canceled, and, in fact, the condition simply means ruin to one of the most prosperous industries in the San Joaquin Valley if the blockade is not soon raised.

SAN JOSÉ.—The damage to orchardists on account of the strike amounts to several thousand dollars, principally on account of cherries in cars bound for the East, which are unable to get to market on account of the blockade. The canneries are not packing cherries this year, and consequently the growers depend entirely upon the Eastern market. Before the blockade about half of the crop had matured and had been disposed of, but the remainder is almost a total loss. The loss on other varieties of fruit will not be great, as the bulk of the crop is dried.

LOS ANGELES.—There have been no complaints as yet on the part of fruit growers in this vicinity on account of the railroad tie-up, unless in a few individual instances. There is little fresh fruit shipped at this time, and most of that can find a ready market in Los Angeles.

The complete tying up of all trains, and the uncertainty of moving freight, stopped all fruit traffic from the latter part of June to the end of July. It was not until the last few days of July that regular movements of fruit trains were resumed, and in the meantime a very large and important part of the fruit season had passed. The early fruit sections were especially the sufferers by the blockade, as the market for early fruits was practically closed before the blockade was raised. Sections devoted to later fruits, while suffering somewhat from the tie-up, did not feel it so severely.

In regard to the condition of the present season's crop, the demand, prices, and result of the tie-up, E. T. Earl, President of the Earl Fruit Company, writes:

SACRAMENTO, CAL., August 3, 1894.

B. M. LELONG, Esq., Secretary State Board of Horticulture, San Francisco, Cal.:

DEAR SIR: Replying to yours of the 2d inst., the deciduous fruit crop in California for the present season is one of the largest ever grown. Nearly all varieties are a full crop, and some are exceedingly heavy. We have heard of no real failure in any district.

The deciduous fruit crop in the Eastern States is light, but the hard times and scarcity of money have had a very depressing effect on California green fruits; at the same time fair prices have been realized.

The railroad strike seriously interfered with the shipping of California fruit for about three weeks in July, and at a time when heavy shipments should have been made. A great deal of fruit became too ripe, and very little was realized for it, as it could not be shipped East, and the local markets would not take it. Fruit suitable for drying purposes was dried, and if decent prices are realized for dried fruits, such varieties will not prove a total loss.

Since the strike ended heavy shipments of fruit have been made to Eastern markets. Over 500 cars went East during the week ending July 28th. In consequence of these

heavy shipments we anticipate low prices will rule for some time, as they will certainly overstock Eastern markets.

The total shipments from California to August 1st are about the same as to same date last season, notwithstanding several weeks of the present season were lost. If reasonable prices are realized in Eastern markets, we anticipate that shipments this season will be several thousand cars in excess of last season. It all depends upon the Eastern markets, however.

Yours, very truly,

E. T. EARL,
President.

APRICOTS.

Apricots have yielded phenomenally well this season. In the early spring a late frost nipped some of the orchards on the lower and more exposed lands, and it was at first feared that much damage had been done, but subsequently it developed that little injury had been done even in those exposed locations, while on the higher lands the trees were overburdened with fruit, and vigorous thinning was a necessity.

Prices generally were satisfactory. In the southern counties fruit was sold by the acre on the trees, and prices ranged from \$40 to \$400 per acre. Apricots delivered at the drying-grounds brought \$30 per ton. In Sutter County \$27 50 was offered for apricots for drying.

While the output has been very large, the size of the fruit has not reached the usual average, and the first grade pack known as No. 1 or fancy has been a smaller proportion of the whole than in previous seasons.

The output of dried apricots this season will be very largely in excess of that of any previous year; it is now estimated at from 8,000 to 10,000 tons. The largest previous record is that of 1891, when the output of dried apricots was something in excess of 6,000 tons. The increase in dried apricots this year is largely due to the strike which tied up the railroads in the midst of the shipping season, shut off the Eastern market, and compelled the growers to make other disposition of their crops. The strike also demoralized the market for early dried fruit, and 118 carloads of this season's crop, which was ready for shipment at 9 to 10 cents per pound, were left in the growers' hand until the later fruit increased the supply, and the price dropped to 6½ and 7. Some few offers at these figures were accepted, but as California growers have practically a monopoly of this fruit, it is improbable that much will be sold at these figures. At a meeting of representatives of fruit exchanges throughout the State, held at San José on August 4th, a resolution was passed fixing the price of dried apricots at 8, 10, and 12 cents per pound for the three higher grades; and as the great bulk of the crop was represented, it is probable that only small lots in the hands of individuals who are forced to sell will be disposed of at the lower prices quoted.

PRUNES.

Prunes have fallen far below the average, and while the new orchards which have come into bearing will add very largely to the bulk of the total output, the yield falls about 30 per cent below the average. There were limited districts where a full crop was reported, but in the principal prune sections, from which the bulk of the crop is derived, the fruit set very light, and not over one fourth to one third of the usual annual yield was reported. The favorable growing weather and the thinning out of the fruit have somewhat increased the size of that remaining, but

this increase in size was not sufficient to make up the deficiency in yield. The many new orchards, however, which added their yield to the total bulk, very largely made up for the deficiency, and while the average yield is far below, the total output of the State will approach that of former years. The total product of prunes in the State will probably foot up nearly 40,000,000 pounds.

The average consumption of prunes in the United States is now 70,000,000 pounds, of which California supplies two thirds, and in an ordinary year with a full average crop our local product would entirely force the foreign article from the market.

This brings us face to face with the important question of a future market for our prune crop. California this season, with but a partial crop, has produced two thirds the average annual consumption of the United States. Oregon, Idaho, and Arizona are producing prunes to some extent. In our own State there are large areas of young orchards yet to come into bearing, and of those already bearing many have not yet reached their full capacity. When these all contribute their full quota to the annual output, California's yield will be doubled. In view of these facts some measures should be taken with a view to widening our market for this fruit and encouraging its more general use in Eastern households.

Prices offered by dealers have been from 4½ to 5 cents for the new crop, which will not be in until September. The fruit exchanges of the State, however, have fixed the minimum at 6 cents, at which they have determined to hold the fruit under their control.

PEARS.

Pears have yielded an unusually heavy crop, Bartletts ranging at least 10 per cent above the average, and all other varieties being full. In the early season reports from many pear sections were to the effect that fruit was dropping badly, and it was feared that a shortage would prevail in some sections. This fear, however, was not realized, as the dropping stopped before the fruit had been more than sufficiently thinned to insure its quality. What had therefore appeared an evil proved to be a benefit to the grower, and an unusually large crop of fine fruit was the result.

The market price of the pear crop was not so seriously affected by the labor disturbances of the present season as was that of the earlier fruits. When pears came upon the market the strike had nearly run its course, and while the earlier pickings were somewhat affected by it, the greater part of the crop was not interfered with and found its usual Eastern outlet at fair prices.

PEACHES.

From all parts of the State reports of the peach crop are to the effect that it is very heavy, and in active demand at good prices. As was the case with almost all other fruit, the strike interfered very seriously with the marketing of the earlier varieties, and growers who did not have the usual Eastern outlet were compelled to dry. The later varieties found a good market, the Eastern crop being very light, owing to the severe frost in the Eastern peach sections. The canning varieties, which are now being gathered, are turning out as well as the others, and altogether

the present may be said to be the most prosperous fruit season in California.

Prices have not been as good as could have been wished. The strike shut off the usual market for our early fruit, and very much of it sought San Francisco, the only outlet left to it, and prices for awhile were slaughtered. With the resumption of Eastern business, however, they recovered, and the general average for the season was fair. The June quotations for peaches in the San Francisco market ranged from 40 to 75 cents per twenty-pound box; by the end of the month, however, these prices had fallen 25 to 50 per cent. In the middle of July, when the strike had forced a glut in the market, prices dropped to 20 to 35 cents per box, which was the lowest price touched. Upon the resumption of traffic, and the opening of the canneries and driers, prices again advanced.

While the financial depression in the East has very materially curtailed the demand for our fruits at former prices, and the California orchardist has not received as much for his products as in some past years, the very large output of fruit in the State will bring immense sums of money to us. In this connection reports from Sonoma County state:

The fruit crop in Sonoma County is enormous, far surpassing that of any previous year, and the quality has never been excelled. Peaches and pears are marketed by tons instead of by pounds as formerly, and even small orchardists are employing a large number of hands picking and caring for the fruit. They are refusing \$15 a ton for peaches, preferring to dry or can. Pears are quoted at \$12 a ton. Prunes are selling at \$20 a ton to driers. Many new driers have been erected this year, and all the fruit-preserving establishments are employing more help than ever before. Hop growers report that the hop crop in the county is up to the average. A new industry, in the shape of a sugar-beet factory, is to be established at Sebastopol. Farmers intend to engage largely in the cultivation of beets.

Similar reports are made from all the counties of the State. A prominent packer who has made investigations gives the following as his estimate of fruit yield and prices for the present season, which may be accepted as nearly accurate as an estimate can be:

The yield of apricots will be 60,000 tons, of which 5,000 tons will be canned, and the rest dried or shipped as fresh fruit. This crop will make 700 to 800 carloads, and ought to bring in a revenue of \$1,200,000. The price is placed at from \$20 to \$25 for the fresh fruit.

Of prunes, the whole crop, practically, is dried. There will be 50,000,000 pounds of the dried article, and it will be worth \$2,500,000 on the basis of 5 cents per pound.

Of peaches, there will be 75,000 tons, worth, at a conservative estimate, \$1,500,000.

Bartlett pears will yield 25,000 tons, and will be worth \$500,000.

Besides these fruits there are the plums, raisins, almonds and other nuts, oranges and lemons, bringing in larger or smaller amounts, but from the items already given, it can be seen that the aggregate value of the fruit products of California must be a very large one.

COÖPERATIVE MOVEMENTS.

The unsatisfactory prices and treatment which growers have received from commission men and jobbers have encouraged the growth of co-operation in the marketing of orchard products. The success of the Southern California Fruit Exchanges has very largely influenced this, and what has been accomplished in the handling of citrus fruit by this association has been equaled in the manipulation of cured fruits by the Campbell Fruit Union of Santa Clara County. Some interesting facts and figures concerning this association are furnished by the California Fruit Exchange, and taken direct from the books of the company.

The association began business with the purchase of a drying-ground and plant located at Campbell Station, on the S. P. C. R. R., to which they added some acres of land by subsequent purchase. The books show the following facts:

INVESTMENTS.	
17 acres land	\$12,725 00
10 horse-power steam engine	
18 horse-power steam boiler	
2 canning-house prune dippers	
Scales and trucks	
Building, 80x150, one-story	320 00
2 Jones largest fruit graders @ \$160	
1 Jones No. 8 fruit grader	
1 Hamilton prune grader	
1,500 orchard boxes @ 15 cents	
24,000 3x8 drying-trays @ 35 cents	8,400 00
Total	\$21,945 00

These are not exact figures, as many of the trays were turned in by stockholders at various prices according to their condition; but they represent the cost of the material, if all new.

In exact figures the actual investment is as follows: Paid-up stock, \$18,400; indebtedness on land, \$4,000.

The plant is not complete, however, as the building will only store, in addition to the room required for machinery and working, about 150 tons of fruit, so that unless they sell very promptly they choke up. The association has voted to build a fireproof warehouse to hold any surplus which they may wish to store. They propose also some other betterments, and for the next full crop will have to buy several more acres of land. The naked land at that place is worth \$500 per acre. Most associations, of course, can purchase land at a much lower price than that, and require less capital accordingly.

ACREAGE ACCOMMODATED.

The acreage of drying fruits owned by the stockholders of the Union is as follows:

Full bearing, 1893	700 acres.
Younger orchards	522 acres.
Total	1,222 acres.

It is to accommodate the fruit as the younger orchards come in that more land will be required, as well as additional grading machinery, trays, etc., the latter having been taxed rather more than its capacity in 1893, when, on some days, more than 100 tons of green prunes were delivered.

The paid-up stock and indebtedness amounts now to \$18 50 per acre, and it is expected that fully \$25 per acre will be required to furnish a complete plant and sufficient drying-ground. This money will be raised, when required, by sales of additional stock to present members only, as no new members can now be received. The stock can always be sold, however, as it pays regular 7 per cent dividends free of taxes. The naked land at their site is worth \$500 per acre. Had they been able to buy land for \$100 per acre, their present plant would now cost only \$13 per acre of the acreage accommodated.

With the above plant as it is, the association received, in 1893, 3,600 tons of fresh fruit, which made 1,043 tons when dried.

EXPENSE OF OPERATION.

The officers and Directors of the association have hitherto received no compensation, except such as might happen to be employed to do special work requiring full time, for which, of course, they were paid. At the last annual meeting, on account of the growth of the business requiring so much time from the Directors, a small annual fee was allowed to each. The President should, and probably does, receive some additional compensation. The other expenses are such as would necessarily be incurred in any private concern, except that 7 per cent interest on the paid-up stock is charged as an item of expense against the fruit handled. This, of course, goes back to the owners of the fruit, who are also the stockholders. No outside capital is admitted, but as some growers who were able to do so made it possible to start the enterprise, by taking more shares than their acreage required, their interests are equalized by the dividends on their extra stock.

METHODS.

The grower delivers his fruit to the drier in orchard boxes. It is at once placed on the graders, and when graded he obtains his receipt specifying the variety and weight of each grade. All fruit is graded by machinery, and there can be no complaint. From that time its identity is lost, all being dried together, sold by the association, and the proceeds distributed. No money—except a very small sum—is raised for working capital. Several thousand dollars are needed to pay pitters and other help at the beginning of the season, but that is repaid from the first sales of fruit, and it is considered cheaper

to borrow what is needed, for sixty or ninety days at current rates, than to pay 7 per cent on the amount as capital stock for the entire year. If fruit sells promptly, the proceeds are of course distributed. If it is preferred to hold for a time, and growers needed money, it is borrowed by the association on its general credit, and advances made, at the same interest that the association pays. The Directors determine when sales are to be made, but are of course influenced by the judgment of other stockholders, whom they meet daily. All growers receive precisely the same prices for the same grades of fruit, and this is the average price of all the sales of the year for fruit of the same grade. When sales are made through a commission house, the commission agent does not ordinarily handle the money, but the association ships to the purchaser, collects the money, and pays the commission man. Receipts are given for green tons, and settlement made on the same basis. A certain amount, believed to be sufficient, is charged against the fruit, to cover depreciation of plant, wear and tear, insurance, and some other expenses. For 1893, this charge was \$1 per green ton, which, in that year gave the association \$3,600, which leaves them, after paying other charges, a sum sufficient to put the plant in rather better condition than at the beginning of the season.

RESULTS.

After paying all expenses of every kind, the association makes its final settlement. The amounts distributed, per green ton, for 1892 and 1893, were as follows. The numbers of the grades refer to size of fruit, No. 1 being the largest:

	1892.	1893.
		Average.
Apricots, No. 1.....	\$46 29	\$23 16
Apricots, No. 2.....	39 78	
Apricots, No. 3.....	39 68	
Apricots, No. 4.....	29 00	
Peaches—Crawford, Foster, etc.—No. 1.....	28 44	10 86
Peaches—Crawford, Foster, etc.—No. 2.....	27 98	
Peaches—Crawford, Foster, etc.—No. 3.....	31 68	
Peaches—Crawford, Foster, etc.—No. 4.....	24 00	
Muir peaches, Nos. 1-2.....	46 67	21 16
Muir peaches, Nos. 3-4.....	48 82	
Prunes (average).....	85 00	34 00

The low prices received for apricots and peaches in 1893 are attributed to the fact that exceptional financial conditions, rendering borrowing impossible, compelled a sale of these goods early in the season, before the southern growers had sold out. Fair prices are never expected in full crop years until goods in hands of unorganized growers have been cleaned up.

The prices received in 1892 indicate what may happen again in years where the crop is short and shrinkage light

SHRINKAGES.

The following table of the experience of the Campbell Union for 1892 and 1893 is worthy of careful study by those contemplating the sale of their fresh fruit to driers:

	1892.	1893.
		Average.
Apricots, No. 1.....	5.10 to 1	5.54 to 1
Apricots, No. 2.....	5.30 to 1	
Apricots, No. 3.....	4.92 to 1	
Apricots, No. 4.....	5.32 to 1	
Crawford peaches, No. 1.....	5.78 to 1	6.97 to 1
Crawford peaches, No. 2.....	5.68 to 1	
Crawford peaches, No. 3.....	4.83 to 1	
Crawford peaches, No. 4.....	5.28 to 1	
Muir peaches, Nos. 1-2.....	3.75 to 1	4.71 to 1
Muir peaches, Nos. 3-4.....	3.50 to 1	
Salway peaches (average).....	4.03 to 1	5.45 to 1
Cling peaches (average).....	5.35 to 1	6.63 to 1

In the above tables the numbers of the grades of fruit refer to the sizes as they come from the graders, No. 1 being the largest.

It must be remembered that while the Campbell Union expects to invest in the end \$25 per acre for a complete, thoroughly equipped plant, with drying-ground costing \$500 per acre, they began on a much more modest scale. If they had been able to get land worth not more than \$100 per acre, their present plant would have cost \$13 per acre of orchard served instead of \$18 50.

FRESH AND DRIED FRUIT PRICES COMPARED.

Many growers are at a loss to know, when offered prices for fresh fruit, what prices they must get for dried fruit to pay them equally well. The following table, compiled last year from the experience of the West Side Fruit Growers' Association in Santa Clara County, will be found a fair guide:

Fruit.	Pounds green to make one dry.		Cost of drying per dried pound.	Equivalent net prices per ctl. of dried, compared with prices per green ton, on basis of shrinkage of 1891.					Net average prices per ctl. realized for dried fruits, after paying all expenses.	
	1891.	1892.		\$30 00	\$35 00	\$40 00	\$45 00	\$50 00	1891.	1892.
Moorpark apricots..	5½	5½	2 cents.	\$9 87½	\$11 18	\$12 50	\$13 81	\$15 12	\$7 25	\$15 00
Other apricots.....	6¼	5¾	2 cents.	11 37	12 94	14 50	16 06	17 62	6 50	13 13
Early peaches.....	5½	5¼	1½ cts.	9 75	11 12	12 50	13 87	15 25	5 50	11 00
Late peaches.....	5	4½	1½ cts.	9 00	10 25	11 50	12 75	14 00	{None dried.	Not sold.
French prunes.....	2.54	1.92	¾ cts.	4 56	5 19	5 88	6 46	7 10	\$5 30†	\$8 87½†

†The prices given for prunes are for the four sizes. The general average will vary a little either way in different years, as the prunes run large or small.

The above table was prepared for Santa Clara County, where, except for peaches, rates less than \$30 per ton for fresh fruit seldom need to be computed. For the benefit of less ambitious districts we add the equivalent prices at \$20 and \$25 per ton, viz.: At \$25 per ton—Moorpark apricots, \$8 56; other apricots, \$9 81; early peaches, \$8 37½; late peaches, \$7 75; French prunes, \$3 87½. At \$20 per ton—Moorpark apricots, \$7 25; other apricots, \$8 25; early peaches, \$7; late peaches, \$6 50; French prunes, \$3 25.

The meaning of this is that the buyer who pays the named prices per fresh ton must get the corresponding prices per dry pound *net* to get even, provided his shrinkage is the same, as well as his expense of drying and sacking. Interest at 8 per cent on plant and something for depreciation is reckoned in cost of drying. The grower who, with his family, does the work, and who reckons no interest on drying-ground or plant, and allows nothing for depreciation, would, upon the face of it, save most of the cost of drying.

In regard to shrinkages, growers must estimate for themselves, as they vary more or less. The greatest variation is among the different varieties of peaches. The shrinkages of the East Side Fruit Growers' Union of Santa Clara County for 1893 were as follows:

Apricots (all varieties).....	5.56 to 1
Peaches (all varieties).....	6.04 to 1
Pears (all varieties).....	7.11 to 1
Nectarines (all varieties).....	8.00 to 1
French prunes.....	2.66 to 1
Silver prunes.....	3.18 to 1
German prunes.....	2.86 to 1
Egg plums.....	4.98 to 1

MOVEMENTS OF FRUITS.

The following table gives the total fruit imports into the United States for the year ending June, 1894:

Kind.	Quantity— lbs.	Value.
<i>Dutiable.</i>		
Figs	7,985,959	\$392,040
Lemons		4,285,278
Oranges		1,127,005
Plums and prunes	9,908,122	416,342
Raisins	13,751,050	554,090
Preserved fruits		528,551
All other fruits		1,159,545
Almonds	7,436,784	799,453
All other nuts		631,738
Total		\$9,862,062
<i>Free.</i>		
Bananas		\$5,121,364
Cocoanuts		786,777
Currants	52,664,843	774,802
Dates	12,408,172	387,585
All other		1,820,074
Total		\$8,890,102
Grand total imports		\$18,752,164

The total importations for the same period last year were \$23,687,422, showing a falling off in the value of fruit imports of \$4,935,258. How much of this was due to the depression of business and financial stringency and how much to California's increased output, which is pressing foreign imports close, it is of course impossible to state. The figures given, however, indicate that in several departments California does not yet occupy the entire home market, nor so much of it as she should. While in fancy brands of raisins and prunes we are hardly prepared to contest the market with foreign packers, inasmuch as our growers have not turned their attention to these brands, yet the importation of 9,908,122 pounds of plums and prunes and of 13,751,050 pounds of raisins, at a cost of \$970,432, indicates that there is still a large domestic field for these products.

The importation of Zante currants for the past year was 52,664,843 pounds, appraised at \$774,802. This fruit has as yet been produced to but a limited extent in California, but enough has been done to prove our capabilities in this direction, and it would appear that here is an opening in our domestic market for another California industry that we should fill.

A very considerable export trade in fruit is carried on by sea between California and the Islands, Central and South America, China, and Japan. A large proportion of this trade consists of canned fruit, which finds its way to all points in the western hemisphere. Apples form another important article of fruit export, and are shipped largely to Central America and Australia. The following tables give the exports and imports of fruit from the port of San Francisco for the fruit season, by months, commencing with November, 1893:

Exports of Fruit by Sea from the Port of San Francisco, for the Nine Months ending July 30, 1894.

Kind.	Value.	
1893—November—Apples, fresh (2,285 bbls.)	\$5,264 00	
Canned fruit	22,201 00	
All other fruit	3,982 00	
Nuts	1,309 00	
		\$32,756 00
December—Apples, fresh (2,084 bbls.)	\$4,099 00	
Canned fruit	29,139 00	
All other fruit	1,043 00	
Nuts	1,065 00	
		35,346 00
1894—January—Apples, fresh (766 bbls.)	\$1,623 00	
Canned fruit	13,148 00	
All other fruit	1,787 00	
Nuts	700 00	
		17,258 00
February—Apples, fresh (410 bbls.)	\$398 00	
Canned fruit	30,725 00	
All other fruit	1,146 00	
Nuts	742 00	
		33,511 00
March—Apples, dried (5,000 lbs.)	\$475 00	
Apples, fresh (223 bbls.)	678 00	
Canned fruit	16,381 00	
All other fruit	3,019 00	
Nuts	468 00	
		21,021 00
April—Apples, fresh (130 bbls.)	\$358 00	
Canned fruit	17,492 00	
All other fruit	2,469 00	
Nuts	499 00	
		20,181 00
May—Apples, dried (10,000 lbs.)	\$1,225 00	
Apples, fresh (18 bbls.)	85 00	
Canned fruit	18,089 00	
All other fruit	4,082 00	
Nuts	403 00	
		23,884 00
June—Apples, fresh (47 bbls.)	\$88 00	
Canned fruit	11,489 00	
All other fruit	2,833 00	
Nuts	280 00	
		14,690 00
July—Apples, fresh	\$1,186 00	
Canned fruit	14,185 00	
All other fruit	5,316 00	
Nuts	658 00	
		21,345 00
Total		\$220,629 00

Imports of Dutiable Fruit by Sea at the Port of San Francisco for the Nine Months ending July 30, 1894.

Kind.	Value.	
1893—November—Oranges	\$1,479 00	
Preserved fruit	5,256 00	
All other fruit	1,986 00	
Almonds	97 00	
All other nuts	334 00	
		9,152 00
December—Oranges	\$3,159 00	
Preserved fruit	1,081 00	
All other fruit	1,036 00	
Almonds	938 00	
All other nuts	2,142 00	
		8,356 00
1894—January—Figs	\$7 00	
Oranges	2,353 00	
Preserved fruit	1,490 00	
All other fruit	1,758 00	
Almonds	212 00	
All other nuts	243 00	
		6,063 00

1894—February—Oranges.....	\$234 00	
Plums and prunes.....	345 00	
Preserved fruit.....	1,962 00	
All other fruits.....	1,914 00	
Almonds.....	23 00	
All other nuts.....	63 00	
		\$4,541 00
March—Oranges.....	\$35 00	
Preserved fruits.....	888 00	
All other fruits.....	1,737 00	
Almonds.....	301 00	
All other nuts.....	97 00	
		3,058 00
April—Oranges.....	\$39 00	
Preserved fruits.....	1,604 00	
All other fruits.....	2,102 00	
Almonds.....	15 00	
All other nuts.....	224 00	
		4,074 00
May—Oranges.....	\$5 00	
Preserved fruits.....	1,889 00	
All other fruits.....	2,378 00	
Almonds.....	89 00	
All other nuts.....	193 00	
		4,554 00
June—Oranges.....	\$6 00	
Preserved fruits.....	873 00	
All other fruits.....	2,336 00	
Almonds.....	87 00	
All other nuts.....	96 00	
		3,398 00
July—Lemons.....	\$55 00	
Preserved fruits.....	1,004 00	
All other fruits.....	1,779 00	
Almonds.....	13 00	
All other nuts.....	58 00	
		2,909 00
Total.....		\$46,045 00

The following table shows the movements of fruit by months over the lines of the Southern Pacific Railroad, from the close of the last fruit season. This does not include shipments from Southern California points, from which information was not obtainable:

Number of Tons of Various Commodities Forwarded East from California Points Named.

Month.	From—	Green Fruit—De- ciduous.	Dried Fruit.	Raisins.	Nuts.	Canned Fruit and Vegetables.	Green Fruit— Citrus.
November, 1893	San Francisco ..	52	606	113	76	1,818	-----
	Oakland	190	225	13	-----	145	-----
	San José	1,611	4,218	1	1	803	-----
	Stockton.....	416	686	10,088	1	53	-----
	Sacramento.....	1,164	1,517	313	5	458	-----
	Marysville.....	109	270	106	-----	172	-----
	Tons.....	3,542	7,522	10,634	83	3,449	-----
December, 1893	San Francisco ..	67	594	62	16	615	15
	Oakland	30	29	-----	-----	13	-----
	San José	736	1,372	6	-----	358	-----
	Stockton.....	-----	221	2,629	-----	97	-----
	Sacramento.....	263	564	494	-----	357	-----
	Marysville.....	135	263	93	-----	42	-----
	Tons.....	1,231	3,043	3,284	16	1,482	15

Month.	From—	Green Fruit—De- ciduous.	Dried Fruit.	Raisins.	Nuts.	Canned Fruit and Vegetables	Green Fruit— Citrus.
January, 1894..	San Francisco ..	4	405	122	24	694	-----
	Oakland	-----	-----	-----	-----	74	-----
	San José	427	757	2	-----	121	-----
	Stockton	-----	188	1,787	-----	-----	-----
	Sacramento ..	80	332	190	-----	247	-----
	Marysville	76	64	68	-----	22	-----
	Tons	587	1,746	2,169	24	1,158	-----
February, 1894..	San Francisco ..	19	446	134	22	1,000	-----
	Oakland	13	36	-----	-----	-----	-----
	San José	246	588	3	-----	193	-----
	Stockton	-----	220	1,849	-----	65	-----
	Sacramento ..	-----	431	198	-----	127	-----
	Marysville	106	128	14	-----	149	-----
	Tons	384	1,849	2,198	22	1,534	-----
March, 1894.....	San Francisco ..	1	592	22	5	1,363	-----
	Oakland	-----	27	12	-----	10	-----
	San José	83	1,090	-----	-----	586	-----
	Stockton	-----	234	1,153	-----	30	-----
	Sacramento ..	-----	367	48	2	429	-----
	Marysville	-----	96	14	3	180	-----
	Tons	84	2,406	1,249	10	2,598	-----
April, 1894.....	San Francisco ..	-----	631	112	4	2,061	1
	Oakland	-----	27	-----	-----	129	-----
	San José	13	1,541	-----	-----	595	-----
	Stockton	-----	216	1,788	-----	13	-----
	Sacramento ..	-----	208	119	-----	865	12
	Marysville	-----	48	11	-----	99	-----
	Tons	13	2,669	2,030	4	3,762	13
May, 1894.....	San Francisco ..	-----	352	79	9	754	-----
	Oakland	-----	-----	-----	-----	32	-----
	San José	61	227	-----	-----	303	-----
	Stockton	-----	106	590	-----	76	-----
	Sacramento ..	814	38	117	-----	363	-----
	Marysville	83	51	-----	-----	-----	-----
	Tons	958	774	786	9	1,528	-----
June, 1894.....	San Francisco ..	21	112	9	3	665	-----
	Oakland	620	-----	-----	-----	-----	-----
	San José	1,727	40	-----	-----	293	2
	Stockton	188	4	435	-----	129	-----
	Sacramento ..	6,238	13	-----	-----	136	-----
	Marysville	816	-----	-----	-----	-----	-----
	Tons	9,610	169	444	3	1,223	2
July, 1894.....	San Francisco ..	11	90	6	1	1,146	-----
	Oakland	234	-----	-----	-----	58	-----
	San José	297	12	-----	-----	138	-----
	Stockton	1,042	272	218	-----	-----	-----
	Sacramento ..	11,837	379	-----	-----	85	-----
	Marysville	829	158	1	-----	182	-----
	Tons	14,250	911	225	1	1,609	-----

CALIFORNIA FRUIT IN ENGLAND.

The shipment of fresh deciduous fruit direct to London, which was tried as an experiment two years since, and suspended in 1893, has been resumed this season by the California Fruit Transportation Company, who made their first shipment on August 5th. The train consisted of eleven refrigerator cars of choice, selected fruits, shipped by J. Z. Anderson, A. T. Hatch, F. H. Buck, Pinkham & McKevitt, C. W. Reed, and the Florin Fruit Growers' Association, from Suisun, Vacaville, Florin, and Gridley. The fruit was consigned direct to London, England, to W. N. White & Co., via the Union Pacific, C. & N. W., and Erie Dispatch to New York. At New York the fruit was transferred to the fast steamship Paris, of the American line.

The train reached New York in six and one half days, and the fruit was in London six days later. The cost of the freight is about \$750 per car, approximating 20,000 pounds to the car. This shipment was followed during the season by weekly specials of ten carloads each. The agent of the California Transportation Company said, speaking of this shipment:

The shipment of to-day should be sufficient inducement to shippers to take advantage of the chance of getting their fruit into the English markets. Recent advices would indicate that the outlook is promising for regular shipments, which will be distributed all over the United Kingdom. The company has demonstrated the physical part of the venture by the delivery of fruit in London in perfect order, and shippers should encourage their energetic efforts to promote California's interests by opening up this service, as with proper distribution we should handle a thousand carloads of California's luscious fruit during the season at remunerative prices, by relieving the domestic markets when over-supplied.

The fruit shipped consisted principally of Bartlett pears, Early Crawford peaches, and assorted varieties of plums and apricots.

In a review of the experiment made two years since, George H. Appel, Sacramento agent for the California Fruit Transportation Company, gives the following as the result of that year's work:

You will recall our missionary venture in 1892 of exporting California deciduous fruits to the United Kingdom. We of course met with opposition at this end, and also the same thing at the other end—the former on account of doubt of our ability to successfully transport the fruit, the latter with their doubts on the lasting quality of the fruit after coming out of the refrigerators. We demonstrated the physical part of it, and also convinced the British people that with our system of refrigeration the fruit would stand up, and our records show that we forwarded forty-nine cars of fruit to London and Liverpool during the season of 1892, where it was distributed throughout the United Kingdom.

The first twenty-five cars of fruit sold to great advantage, but owing to the heavy charges of \$1,350 per car, besides the commission and other minor charges, left but little for the shipper.

In order to encourage the shipper, the California Fruit Transportation Company made guarantee to a number of shippers of the same net results that could be gotten in New York, and at the same time sold in England, so that it resulted to the benefit of the grower. The last twenty-five cars landed during the excitement of the cholera scare, which retarded the sales, and the fruit did not sell for sufficient in all cases to meet the heavy expense. This, of course, proved a loss to the California Fruit Transportation Company. However, its officials, alive to the situation, being heavily interested in a large equipment of cars, which we have found necessary to furnish to supply the demands, in connection with our desire to promote the interests of California fruit growers, and, in a measure, solve the problem of the so-called over-production of California fruits, we wished to demonstrate our desire to open this source.

Through the efforts of our officials we have secured a rate of \$750 per car, which includes all expense, delivered in London. We have arranged with the American line of steamers, in which we will have our refrigerators, in the fast-sailing steamers New York, Paris, Berlin, and Chester, making weekly trips from New York. Our intention is to load out five cars weekly to make fast time to New York, which will be transferred to refrigerators on these steamers, making close connection, and with everything being

equal, should make about thirteen days to London—possibly may run a day or two longer should the steamers encounter stormy weather, etc.

The fruit will be sold in London for 5 per cent commission, and sales will be made direct to the shippers. This company has no connection whatever with the handling of the fruit, merely furnishing the transportation. However, we would be glad at any time to assist shippers in any way in this connection, and expect to have a regular report from different receivers in London and Liverpool and other cities in the kingdom, which we will be pleased to furnish you from time to time.

Our latest reports would indicate that heavy frosts have seriously damaged the small fruits in England, and drought has caused the pears to drop in France, and the plum crop in Germany is not so heavy as usual, so that shipments of choice peaches, plums, and pears will surely result advantageously to the shippers.

We found last season that California fruit would compete successfully with other fruit; in fact, we found that we could deliver California fruit in London oftentimes in better condition than the French William (Bartlett) from France, just across the channel.

Our Vice-President, E. R. Hutchins, personally superintended the sale and handling of this fruit in 1892. He has just returned to Chicago, after consummating arrangements here with the railroad companies, and he has stated it was no unusual sight to see fruit peddlers with small carts, with signs reading, "California fruits," which sold readily at good prices. The middle class of people in England do not eat very much fruit, on account of the expense of that fruit grown in hot-houses, so that we think with the rates we have secured, that this fruit can be placed within easy reach of the masses, and see no reason why a great deal of California fruit cannot be sold, thereby relieving the domestic markets in a time of over-supply, resulting to the benefit of the California growers.

Until such time as we can evolve a better system of shipment of our fruits to England, including cheaper and better transportation, which may be effected by the abolition of heavy refrigerating cars, with their enormous dead weight and expensive icing, the English market can be little else than a last resort into which we may be compelled to send our surplus fruit when our home market cannot consume it. The experiments of 1892 and the experiments of the present season have very largely proved this. That it may some day become a profitable market is very probable, but it will be when we can deliver our fruits in better shape and at lower cost than we are now able to do. Reports which have been received concerning the shipments made this season are flattering as to the reception of our fruit by the English. It has won its way to their regard and there is a demand for more, and when we can lay it down at smaller cost for transportation, and with a smaller percentage of loss, there can be no question but that the English market will be a profitable field to work.

MARKETS FOR FUTURE CROPS.

In considering this question of markets for our future fruit crops, H. Weinstock, of Sacramento, one of our most far-sighted men, writes:

What are the causes of the low prices received in the Eastern markets this year for California green fruits, and what, in my opinion, is the remedy?

In reply, I beg to say that so far as I can see them, the causes for the low prices are manifold, and may be enumerated as follows: (1) The glutting of markets; (2) The railway strike; (3) Hard times; (4) Unsatisfactory railway service.

As to the remedy, I shall not attempt to touch upon the matter of the railway strike nor hard times; first, because these were matters beyond our control, and, secondly, because let us trust that hard times may, before another season, be a thing of the past. Nor shall I at this time take up the matter of unsatisfactory railway service. I prefer to leave that issue to others who are better prepared to deal with it. I shall devote whatever space you are prepared to give this answer to your questions to the first, and, to my mind, prime cause for the prevailing low prices, namely: the constant glutting of Eastern markets.

We find ourselves in 1894 back again to similar conditions that existed in 1885 and 1886, with this difference: In those years about 1,000 carloads glutted the markets of the East; this year it takes about 7,000 carloads to do it. The difference between the two figures represents the growth in the volume of our shipments, which growth is largely the result of opening the Atlantic sea-board markets, and many interior markets, by the introduction of the auction plan of selling fruits, a system first introduced in connection with the sale of California fruits in 1887.

In spite of the railway strike, the hard times, and the unsatisfactory railway service, the year 1894 should have been a prosperous year for the California fruit grower, who, so to speak, had for the first time in the history of the fruit industry the great market of the East largely to himself, an opportunity caused by the almost total failure of the Eastern crop, and such as may not again present itself in many years. This golden opportunity, however, was largely wasted through lack of proper and intelligent distribution of his products.

As a rule, the markets of the East were kept constantly glutted, and the prices to the grower thereby made ruinously low. Such having been the case in 1894, with a probable shipment of 7,000 cars, and with the Eastern crop almost a total failure, what is likely to be the result when the California fruit crop will aggregate many more than 7,000 carloads, as it surely will within the next few years, and when the Eastern crop shall be a normal one, or an unusually large one? The answer must be self-evident. There can be but one result, and that result one of disaster to the army of fruit growers in our State, and a serious crippling of the entire green fruit industry of California.

As far back as 1885, when our Eastern shipments did not exceed much over 1,000 carloads of green fruit a season, the cry was already raised that we were over-producing, and that the ruinously low prices received in those years in the East were caused by an over-supply. There were many, even among the oldest and most experienced California fruit men—dealers and growers—who at that time strongly advised that we should stop planting and tear up a portion of the trees and vines already planted. And yet, in spite of these opinions, as soon as the causes for the low prices were removed, and our system of handling our fruits in the East changed, and new markets opened out and developed, we have seen the shipments increased four and five fold at better prices than were obtained when 1,000 carloads and less were shipped in a season, showing plainly that the low prices realized in those earlier years were not caused by over-production, but by a lack of proper knowledge and proper facilities for the handling of the fruit.

All this will, to my mind, apply to present conditions. I, for one, do not believe that in a year like this, with a perfect fruit famine in the East, 7,000 carloads should glut all the great markets east of the Rocky Mountains, especially when it is known that the market of New York City alone has, in the past, without breaking, consumed as many as 5,000 carloads of domestic peaches in one week. The fault is not with the fruit nor with the markets, but with our manner of distribution. Fortunately, this is a matter that can be remedied, and every effort should be made to bring about this remedy as speedily as possible.

During the earlier history of the auction-sale system it was comparatively easy to regulate the distribution of our fruits in the East, from the fact that over 90 per cent of the shipments were made through two mediums, the California Fruit Union and the Earl Fruit Company, which made it possible to more or less regulate its distribution. But within the past year or two new conditions have arisen. In place of the great bulk of the fruit passing chiefly through two hands, a large number of coöperative companies, Eastern brokers, fruit commission men, and others have entered the field, and have been making indiscriminate shipments to the various Eastern markets, resulting in disaster all around. Each shipper has, naturally, endeavored to hide his movements from all others, and the result has been that all have worked in the dark, and the routing of fruit has been almost entirely a matter of guesswork. The wonder is not that the loss has been so great to the grower, but that, under the circumstances, the losses have not been still greater. So long as this unintelligent manner of routing and distributing fruit will continue, so long must disaster follow, with injury to all and benefit to none, excepting, perhaps, for the time being, to the Eastern consumer.

Early this year I foresaw the present results, and advocated the establishment of a Bureau of Information, to be supported by all engaged in shipping fruit, whether growers or shippers, the purpose of this Bureau of Information being to issue daily bulletins to all subscribers, showing the condition of each market, the price realized for the various fruits at the various selling points the preceding day, and the contents and destination of the cars of fruit eastward bound, so that all shippers might each morning have before them a photograph, so to speak, of the situation, and in that way be enabled to more intelligently determine where their fruit should be sent.

Though advocating the plan, I had little hope of its adoption this season, realizing, as I did, that many growers and shippers would be loath to reverse the old-time policy of hiding all information concerning the movement of their fruit and follow a new policy of giving to this proposed bureau the fullest information concerning the movements of their fruit. I realized that it would be a hard matter for them to see the necessity and the wisdom of such a step until serious loss and suffering alone would finally leave them no choice between this—to my mind—progressive step or ruin. The policy of wild-cat system of shipments, continued this present season, with its disastrous results, has, perhaps, done more to prepare the minds of the shippers and growers for the proposed plan than years of writing or speech-making, and I believe that the time is now ripe for the earnest agitation of such a step.

With the auction system now so thoroughly and so successfully established throughout the East; a system which insures the absolute sale of all fruit immediately on its arrival, at the rate of five minutes to a carload; a system which brings to the grower the highest price his fruit is worth at the most favorable moment, which, of course, is immediately on its arrival; a system which gives the grower absolute protection and insures his getting from the Eastern agent every penny his fruit is sold for; a system which practically means spot cash payment on the part of the Eastern buyers, since all

responsible Eastern receivers are expected to remit within twenty-four hours after the sale; a system which makes it possible for the shipper at this end to know the result of the sale on his entire shipment within an hour of such sale taking place—which information formerly did not, as a rule, reach him for weeks; a system which has put all Eastern buyers on a level, and has thereby encouraged many hundreds of Eastern dealers, large and small, to deal in California fruits, who formerly either could not or would not handle our fruits, but who in recent years have worked out so many new channels of trade for our products that our shipments, from 1,000 carloads or less in a season, have increased to nearly 7,000 carloads for 1894—yet, with all the advantages and benefits that have followed the introduction of sale by public auction, the auction system has not been able to make it possible for a market that can use but five carloads a day to use ten carloads a day at an equally fair price. Nor is it possible for the human mind to devise a plan that will make a five-carload market handle at a satisfactory price a ten-carload shipment.

The remedy must lie in the direction of sending to the one-carload market one carload of fruit only; to the five-carload market five carloads of fruit only, and so on. The surplus, if there be any, must be retained at home, dried, sold to canneries, or, if this cannot be done, then it is better that such surplus shall, for the time being, rot on tree or vine, rather than be permitted to go East and there demoralize the prices for the great bulk of shipments which otherwise would yield fair prices.

With proper and intelligent distribution, however, there need, as a rule, be no surplus; at least not for years to come. It is to the end that the glutting of the markets be hereafter avoided, and that our fruits be more intelligently distributed, that the proposed "Bureau of Information" is advocated.

I am informed that the State Board of Horticulture proposes to hold its semi-annual meeting in Sacramento November next. An energetic effort should be made on the part of the Board to make that convention a representative one, and to bring together at that time the largest possible attendance of growers and shippers, with the view of taking up the problem of regulated distribution in the hope of adopting the plan of establishing a Bureau of Information, or some other plan of still greater merit, that others may be able to suggest.

ORGANIZATION OF FRUIT EXCHANGES.

One of the important events of the past fruit season has been the perfection of the organization of the California Fruit Exchange. This organization originated under the auspices of the State Board of Horticulture, and was the outgrowth of a desire on the part of the growers for uniformity in methods of grading, packing, and marketing, which uniformity only coöperation on the part of the growers could procure. The matter was brought before the Fruit Growers' Convention at San José in an essay by A. L. Bancroft, and took shape at the next convention, held at Los Angeles, in the form of a set of resolutions, in which the organization was determined upon. The wishes of the growers having been thus definitely manifested, every aid possible was rendered to the new organization until it became strong enough to act independently.

The necessity for, aims, and history of the California Fruit Exchange are set forth in the following paper from the pen of Edward F. Adams, who has had the management of the organization from the beginning:

The evolution of the coöperative movement in California has, during the past year, brought into existence the California Fruit Exchange, which may be briefly described as a general agency for all fruit growers in matters of common interest. These matters of common interest are far more numerous than appear at first sight. For example, the raisin industry and the orange business would seem to have no common bond; but scattered among the orange districts there are a certain amount of raisins, not large enough to support a separate raisin organization, but quite sufficient to seriously impede, without benefit to themselves, the operations of any organization of the great raisin industry centralized in the San Joaquin Valley. It is of great value to the organized raisin industry to be able to make use of the orange growers' organization to gather in the scattering raisins of Southern California to be handled with those of the San Joaquin Valley. The common interest of the citrus and deciduous (fresh) fruit interests are still more obvious. The citrus fruit people need salaried Eastern representation during the winter, and the deciduous fruit shippers during the summer. The channels of trade for the two lines of fruit are identical; it would be very silly for the citrus fruit men to keep an Eastern agent and office half the year, and the deciduous fruit shippers another agent and another office during the other half of the year, when by uniting they can employ the same agent and the same office and get better service with less expense.

All branches of the industry are alike interested in matters affecting transportation, tariff, refrigeration, extension of markets, grading, inspection, brokerage, prevention of consignments, banking facilities, advertisement of California products, cost, character and quantity of competing goods, taxation of orchards, and other matters of general interest, wherein they can be best and most economically served by a common expense. It is also true that if organization is maintained it can only be by constant "promotion" overcoming the disintegrating influences which are constantly at work. The State Exchange is designed to represent and act for the fruit growers of the State in regard to all these matters. Incidentally it may itself sell fruit, as it is doing this year. Logically, however, it ought to sell no fruit unless it sells all of it, because it assumes to represent all growers, or at the least all who contribute to its support, alike, but if it undertakes the sale of a portion of the fruit it must become a competitor of those whose fruit it does not sell, and yet who contribute to its support. This position is logically false, and has in it the seeds of death. In its final form the Exchange must render to all equal services at equal cost.

The California Fruit Exchange originated—or at least took form—at a meeting of the State Horticultural Society held at San José in October, 1893, at which a committee was raised to "organize a State Exchange for the marketing of California's product of dried fruit, prunes, raisins, almonds, nuts, beans, honey, etc.," with instructions to appoint the first Board of Directors from their own number. The committee performed its duty as instructed, appointing a Board of seven Directors, who promptly organized and elected a manager. It was agreed, however, that the Directors so appointed should serve only until the fruit growers of the State could be further consulted, and determined, by a State Convention specially called, whether the organization should be made permanent, and if so, who should serve as Directors for the first full year. This convention was called by the State Horticultural Society, at the request of the Directors of the Exchange, and met in San Francisco on December 27th. This convention—in which twenty-six counties were represented—formally resolved: "That this convention approves, and, on behalf of the fruit growers of California, accepts the work done under the resolution adopted by the State Horticultural Society at its October meeting in San José, recognizing hereby the California Fruit Exchange as now organized as an authorized representative of the fruit growers of California."

The convention also determined that the number of Directors should be eleven. The Directors subsequently incorporated the Exchange under date of January 23, 1894. The authorized capital of the Exchange is \$100,000, of which, at this writing, but a small portion has been subscribed.

During the present year the main duty of the Exchange has been that of organization. The plan of organization is that of promoting local incorporated associations which should deal with individual growers, and in behalf of them with other associated growers through the medium of the State Exchange, which is their joint agent for common purposes. As the Exchange, also, to perform its functions, must have adequate capital, its stock was offered for sale, but not pushed with the vigor which would have been used had growers been in better financial condition, and had the financial plans of the Exchange been more fully matured. It has been necessary to determine the exact uses for which capital is required, the amount needed, and the precise methods by which it may be safely guarded, and made, while promoting the interests of growers generally, to earn reasonable dividends to those who supply it. At this writing these matters are becoming gradually shaped in the minds of the management of the Exchange, and by the time it appears in print it is presumed that good progress will be made in this essential part of the movement.

The degree of success which the Exchange may ultimately attain will depend on the financial support which growers give it. Financial support invariably secures moral support. There are growers enough who really desire to cooperate to enforce the adherence of the residue if they choose to endow an Exchange with the necessary capital, and supply it with the revenue necessary to secure the services of a competent management. Money is power in cooperation as in other things, and it is for the growers to determine whether this power shall be used for them or against them.

The fundamental idea of the Exchange is the financial independence of the grower, and the management of the fruit output of the State substantially as if it were owned by one person. All the details of operation are involved in these two generalizations. The aggregate credit of any community is sufficient for its aggregate necessities. If it were not so the community would disintegrate. Cooperation enables the aggregate credit to be pledged for the benefit of the weak without danger to the property of the strong. This would seem impossible, but the explanation is simple. While the needs of the poor man are small, they are urgent, and the securities which he can give, while not such as sound banking can consider, are perfectly good in the hands of his neighbors engaged in the same business and experts therein; and these neighbors can much better afford the care and management of the securities than to suffer the demoralization of the markets incident to the sacrifice of the poor man's crops. The aggregate credit can then be pledged for the benefit of those who need it, and the market is protected from anything but a general over-production involving the credit of all.

The advantage of marketing the entire product of an industry under the direction of the ablest of those engaged in it, and the justice of taxing the entire output for the necessary expenses incurred for the benefit of all, are too obvious to require discussion. It is also unnecessary to speak of the convenience and comfort which these methods bring to the weak, who are thus able to lean on the strong arm of society, and to those of

the strong who desire to relieve themselves of the burden of detail. Such matters, and the detailed operations by which these results are sought, are fully discussed in the periodical press and in the documents issued by the various societies. What result may follow from the effort now making cannot be foretold. That some valuable advantage is to be secured is now evident, but to what extent and how rapidly our fruit growers may develop the power to manage their own business wisely, depends on the ability of society to digest and assimilate common sense in business affairs. It is an experiment with human nature not tried on this scale before.

In the line of coöperation the orange growers of Riverside have determined to work together in the marketing of their products. A few growers kept aloof from the association for some time, in the hope of getting the increased price of their products without bearing any of the expense incurred. The Directors of the Fruit Exchange passed a resolution that their organization should disorganize unless 90 per cent of the growers would sign the contract. August 15th was set as the time limit, and by this date enough signatures had been secured to insure the permanency of the Union. Riverside's orange crop this season is estimated at 3,000 to 4,000 carloads, and represents one half the total output of Southern California. The abandonment of the coöperative movement here would necessarily seriously injure, if it did not destroy, it elsewhere, and hence every effort was made to keep the Exchange alive.

This work has resulted in the central organization, with headquarters in San Francisco, and local organizations throughout the State, of which the following is a partial list:

*Santa Clara County Fruit Exchange	San José.
*West Side Fruit Growers' Association	Santa Clara.
*Willow Glen Fruit Union	Kensington.
*East Side Fruit Growers' Union	San José.
*Berryessa Fruit Union	Berryessa.
*Campbell Fruit Union	Campbell.
*Riverside Fruit Exchange (citrus)	Riverside.
*Semi-Tropic Fruit Exchange (citrus)	Los Angeles.
*Orange County Fruit Exchange (citrus)	Santa Ana.
*San Antonio Fruit Exchange (citrus)	Pomona.
*San Diego Fruit Exchange (citrus)	San Diego.
*Colton Fruit Exchange (citrus)	Colton.
*Duarte Fruit Exchange (citrus)	Duarte.
*Contra Costa County Fruit Union	Martinez.
*California Fruit Association	Vacaville.
*Producers' Raisin Packing Company	Fresno.
*Easton Packing Company	Easton.
*Hanford Dried Fruit and Raisin Company	Hanford.
*Hanford Raisin Company	Hanford.
*Alliance Business Association	Armona.
*Penryn Fruit Company	Penryn.
*Napa Dried Fruit Company	Napa.
*Coöperative Fruit Company	Newcastle.
*Florin Coöperative Fruit Company	Florin.
Vacaville Dried Fruit Exchange	Vacaville.
Highland Fruit Association	Pasadena.
Mount Shasta Fruit Association	Anderson.
*Glendale Fruit Growers' Union	Glendale.
*Colfax Mountain Fruit Company	Colfax.
Sutter, Butte, and Yuba County Fruit Exchange	Yuba City.
Santa Cruz County Fruit Union	Santa Cruz.
Santa Cruz Mountain Fruit Exchange	Wrights.
Corralitos Coöperative Drying and Canning Company	Corralitos.
Sonoma County Fruit Exchange	Santa Rosa.
Kern County Fruit Exchange	Bakersfield.
Rajaro Valley Fruit Exchange	Watsonville.
Niles Coöperative Fruit Union	Niles.
Pomona Fruit Growers' Association	Pomona.
Kingsley Deciduous Fruit Association	Pomona.
East Side Fruit Growers' Union	Pomona.
Oswald Fruit Association	Yuba City.

*Organized before the State Exchange.

The Los Nietos and Ranchito Walnut Growers' Association have accomplished a good work in the marketing of their crop, and reports from them are that all is moving with them in the most satisfactory manner.

J. A. Montgomery, Secretary of the association, furnishes the following report of that association's crop and sales, together with the prices received for the year 1893: Total number of sacks of walnuts, 12,936; weight, 1,373,923, or 80 carloads, for which the association received \$90,804 43. First grade hard-shells netted the association per 100 pounds, \$6 33½; second grade hard-shells, \$4 40; first grade soft-shells, \$7 40; second grade soft-shells, \$5 64. Received by growers, \$87,463 17; cost of sacks, \$1,979 95; expense of handling crop, \$949 15; total, \$90,392 27.

More inharmony has been reported between the raisin growers and packers. A crisis was reached on August 15th, when the new organization known as the State of California Raisin Growers and Packers' Association met a number of packers who had not signed the roll for the purpose of fixing a schedule of rates. The outcome, however, was satisfactory, and there was a disposition evinced on the part of the packers to work in harmony with the growers. The principal matter before the meeting was the fixing of the schedule of prices for the coming season. The packers were first consulted as to the minimum price of 3-crown raisins, which were accepted as the standard, other grades being rated up and down on this basis. In fixing the price the meeting had but one aim: To establish a rate as high as possible, but they had to allow for the competition of Spanish raisins and of the product of the El Cajon vineyards in San Diego County, which have already been offered for 3½ cents. The discussion of a rate consumed almost the entire day, when a decision was finally reached in favor of 3½ cents. The rest of the grades were quickly arranged as follows, the rate being given in cents:

	Per Pound.
Four-crown, loose	4½
Three-crown, loose	3½
Seedless, loose	3
Two-crown, loose	3
Dry grapes, loose	2½
Sultanas, loose	4

The following prices were adopted for layers, clusters, faced and unfaced raisins, the prices being per box of twenty pounds:

Three-crown layers	\$1 35
Four-crown fancy clusters	1 00
Five-crown Dehesa clusters	2 00
Six-crown Imperial clusters	3 00
Four-crown (unfaced)	1 15
Four-crown (faced)	1 25

It is estimated that about 65 per cent of the output has been secured. About 2,000 of the 3,000 acres in Kings County have been secured, and almost all of Madera County.

NEW FRUIT CLASSIFICATION.

A movement looking to the application of California names to California fruit, and the discarding of the foreign names under which much of it has heretofore been sold, was inaugurated by the Directors of the California Fruit Exchange. The reasons for this movement are obvious. California is to-day one of the leading dried fruit countries of the world;

her products have a world-wide reputation and stand at the head of their kind. This being the case, there is no reason why they should not stand on their own merits, or why the shift of resorting to foreign names of inferior fruit for our superior products should be resorted to. It is for this reason that the new movement has been adopted, and hereafter California fruits will reach the markets under their own distinctive titles. The following is the classification schedule which has been adopted and under which the various fruits will be known:

Raisins—California clusters, in place of clusters, Spanish style.

No. 1 California layers, substitute for 4-crown London layers.

No. 2 California layers, in place of 3-crown London layers.

No. 1 loose, in place of 3-crown loose; No. 2 loose, in place of 2-crown loose; and

No. 3 loose, in place of 1-crown loose.

Seedless Muscatel—No. 1, Thompson seedless; No. 2, Thompson seedless; No. 1, Sultan; No. 2, Sultan.

Apriots—Made from fruit one and three fourths inches in diameter:

No. 1—1, bright in color; 2, free from dirt, etc.; 3, meaty fruit.

No. 2 D—1, bright in color; 2, free from spots, dirt, etc.; 3, meaty fruit.

Made from fruit one and a half inches in diameter:

No. 2—1, bright in color; 2, free from spots, etc.; 3, meaty fruit.

No. 3 D—1, bright in color; 2, free from spots, etc.; 3, meaty fruit.

No. 3—1, bright in color; 2, free from spots, etc.; 3, meaty fruit.

No. 4 D—1, bright in color; 2, free from spots, etc.; 3, meaty fruit.

No. 4—Includes all not placed in the above classes.

Peaches made from fruit two inches in diameter and upward:

No. 1—1, bright in color; 2, free from spots, etc.; 3, meaty fruit.

No. 1 D—1, bright in color; 2, free from spots, etc.; 3, meaty fruit.

Made from fruit one and a half inches in diameter:

No. 2—1, bright in color; 2, free from spots, etc.; 3, meaty fruit.

No. 2 D—1, bright in color; 2, free from spots, etc.; 3, meaty fruit.

No. 3—All not in above classes.

California Prunes to be known as "California Prunes." Grading according to the number to the pound: 40 to 50, 50 to 60, 60 to 70, 70 to 80, 80 to 90, 90 to 100, 100 to 120 and above.

Silver Prunes are classified as follows: No. 1, bright in color; 1 D, brown in color; 2, bright; 2 D, brown.

Pears classified as follows: No. 1, halves, large, bright and clean. All others by description or sample.

"D" indicates that the product is slightly off in some one of the three marked characteristics of the grade.

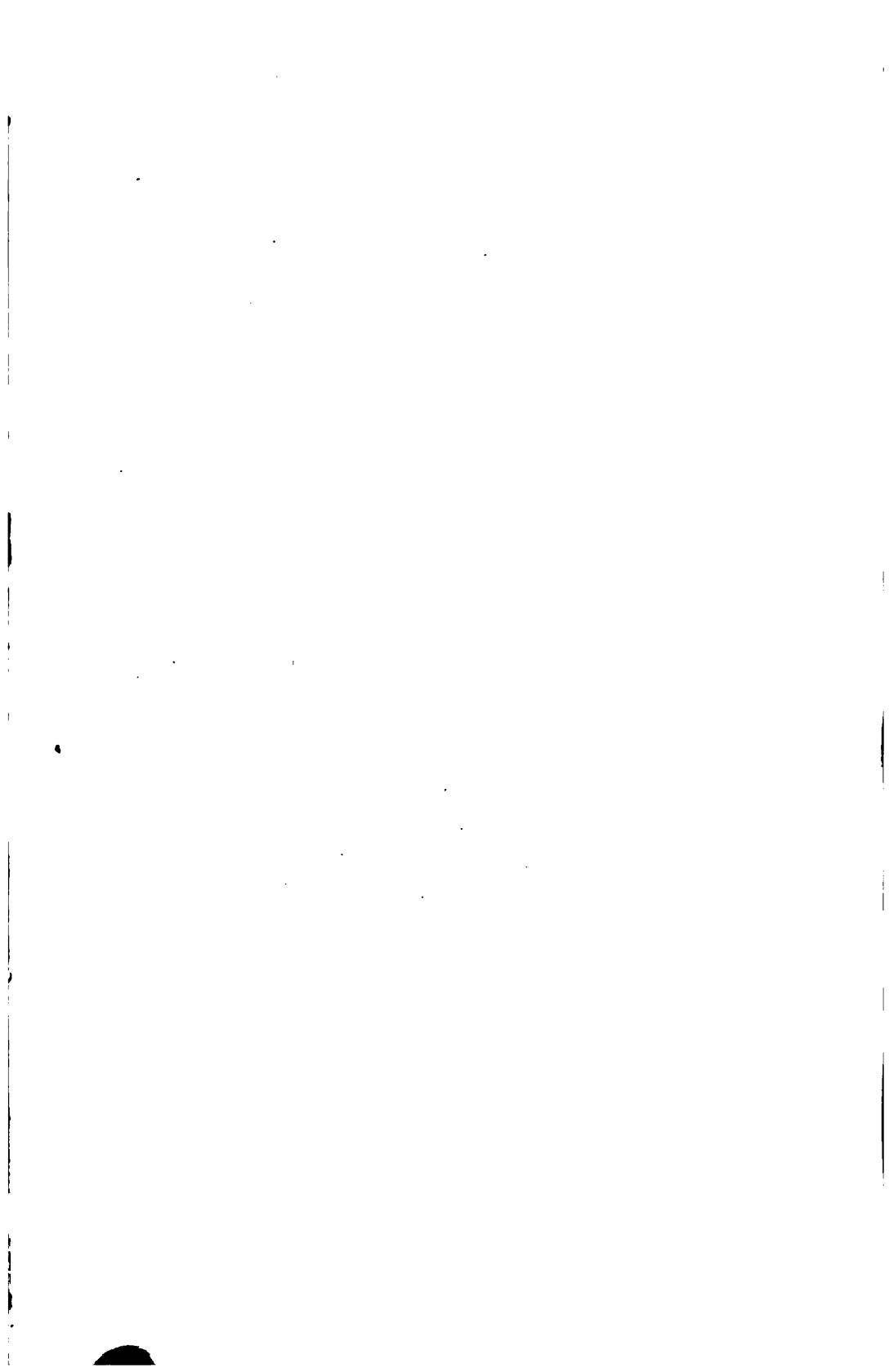
"D" prunes include four classes, equal quantities to each: No. 1, 60 to 70; 2, 70 to 80; 3, 80 to 90; 4, 90 to 100.

NEW PLANT FOR 1894.

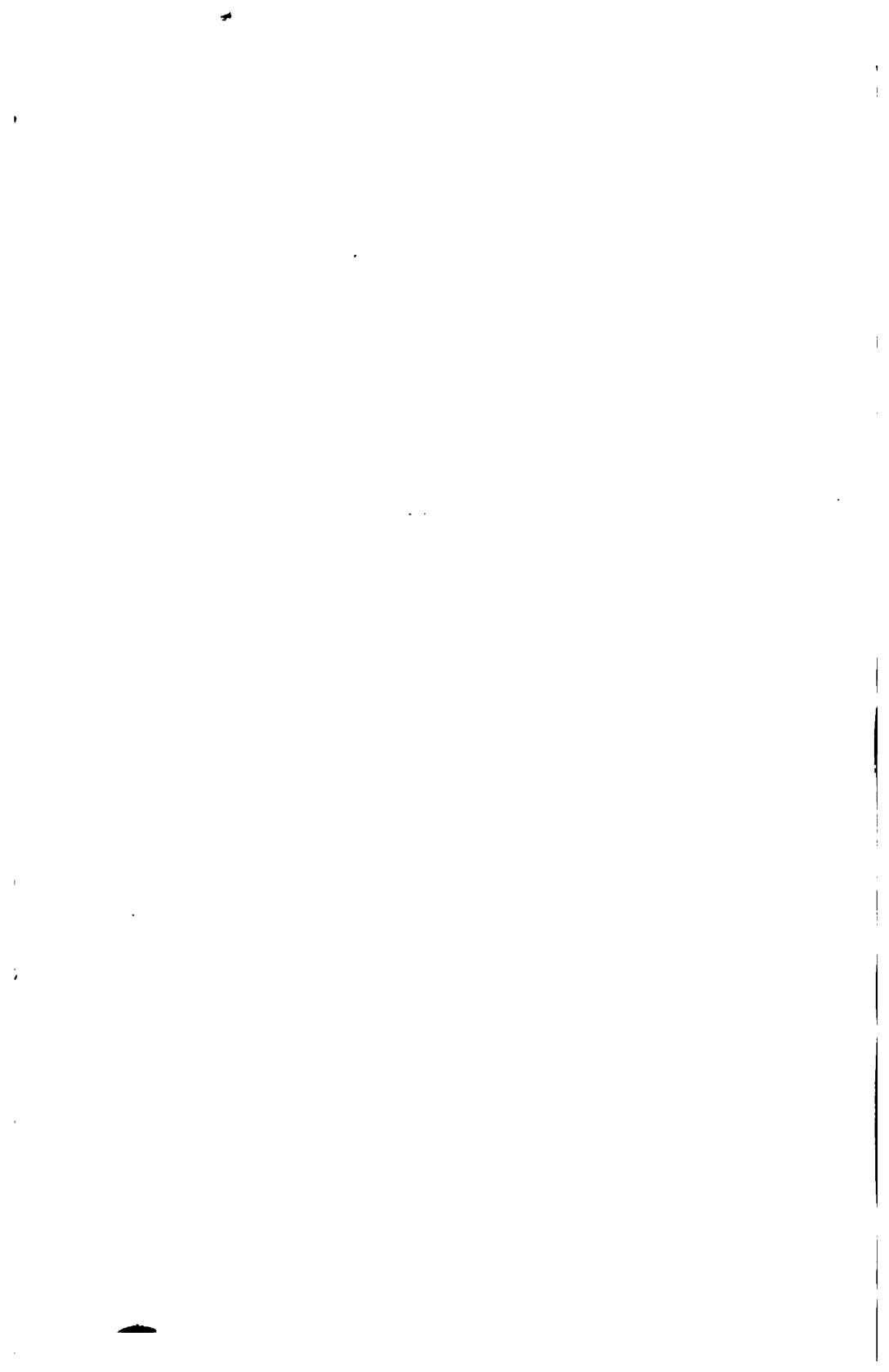
Returns received from twenty-one counties—Alpine, Colusa, Del Norte, Glenn, Inyo, Kern, Los Angeles, Napa, Nevada, Orange, Placer, Riverside, Kings, Madera, San Diego, San Joaquin, Santa Barbara, Santa Clara, Santa Cruz, Sonoma, and Tehama—show an increased acreage of fruit planted in the spring of 1894, of 17,000 acres. The principal fruits have been peaches, prunes, and apriots, in their order. In San Diego the largest plant was to olives, and the second largest to lemons. In Kings, Placer, Sutter, and Kern Counties, peaches and apriots held the first two places. In San Joaquin, Santa Clara, Santa Cruz, and Glenn, prunes and apriots were the favorites; in Los Angeles, prunes and walnuts came first and second; in Riverside, oranges and prunes, and in Madera, raisins and peaches. Returns from Colusa, Del Norte, Napa, Nevada, Santa Barbara, and Sonoma are to the effect that there is no increase in the total acreage of fruit in these counties, and that the new plant has not been more than sufficient to compensate for the loss of the old.

The above figures will cover over half the principal fruit sections of the State, and an estimate of 35,000 acres of new land to all kinds of fruit planted in the present season will probably be as nearly accurate as an estimate could be made.







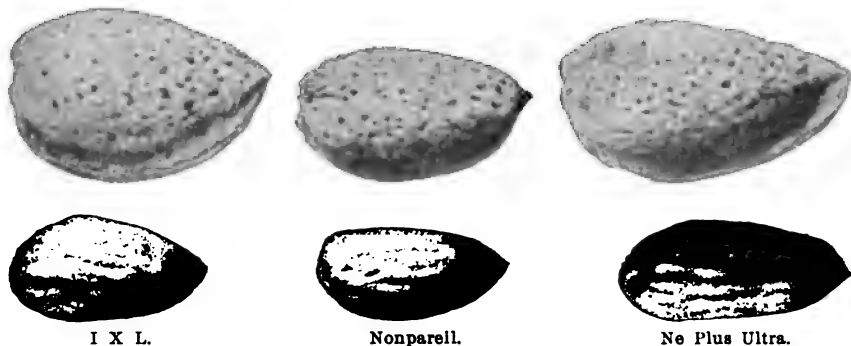






CALIFORNIA ALMONDS.

The almond produced in this State comes into competition at the East with almonds imported from Europe. A century of such trade has naturally given nuts of foreign name a standing in the Eastern markets. Selling by their familiar names, they have the advantage of the California product which is new to the Eastern trade. The result has been that California growers have not hitherto obtained, as a rule at least, the prices secured by the imported nuts sold by their familiar and favorite names. The experience is the same as that which our growers of prunes, raisins, etc., have had to surmount. These products have now largely overcome their disadvantages and accomplished it by convincing consumers that the California articles were superior to the imported. The same course is necessary to place the almond upon a fair commercial basis at the East, and it is toward this end that the State Horticultural Society has made the following declaration on the subject:



VALUE OF CALIFORNIA ALMONDS AS COMPARED WITH OTHERS.*

During the past twenty years California has originated thousands of varieties of almonds in her efforts to obtain something better than those in use. She was successful in her undertaking, having obtained several varieties of thin-shelled, good-flavored nuts. We claim, and the figures in the table below show that the claim is fully maintained, that in our California climate we can grow almonds with much more kernel and much less shell than those sent into the United States from abroad.

The information here given will be found useful to those who deal in almonds, and of value to those who use them, as it will show the varieties to buy in order to get the best returns for the money expended.

* By the State Horticultural Society.

GRADES OF ALMONDS.

They are divided into four grades, viz.:

Hard-shell, including those bearing but 6 ounces or less of kernel to a pound of nuts. They require a sharp blow with a hammer to crack them.

Soft-shell, those having from 6 to 8 ounces of kernel to a pound, and require the use of nut-crackers to crack them.

Extra Soft-shell, having from 8 to 10 ounces of kernel to a pound, and can be readily broken with the fingers.

Paper-shell, having 10 ounces or more of kernel to a pound. A child can easily open them with its fingers.

These grades and this statement have been approved by the California State Horticultural Society, and are thus made official.

One Pound of Almonds, showing the Weight of the Kernel, the Weight of the Shell, and Relative Value of the Leading California Varieties with others.

The Terragona is the leading and best known variety throughout the entire United States, and is imported from Spain in large quantities. It is therefore taken as the standard, and other varieties are compared with it.

Variety.	Grade.	Weight of Kernel, in Ounces	Weight of Shell, in Ounces	Relative Value per Pound, in Cents, Commencing with Different Rates.				Percentage of Value More than the Ter- ragona.
Terragona	Soft-shell	6½	9½	12½	15	17½	20	0
Languedoc	Soft-shell	7½	8½	14½	17½	20½	23½	17½
El Supremo	Soft-shell	7½	8½	14½	17½	20½	23½	17½
Drake's Seedling	Soft-shell	8½	7½	17	20½	24	27½	36½
I X L	Extra Soft-shell	9	7	17½	21	24½	28	40½
Commercial	Extra Soft-shell	9½	6½	18	21½	25	29	41½
La Prima	Extra Soft-shell	9½-10	6½-6	18½	22½	26	29½	48½
La Prima	Extra Soft-shell	When 9½	6	19½	23½	27½	31	56½
La Prima	Extra Soft-shell	When 10	6	19½	23½	27½	31	56½
Princess	Paper-shell	9½-10½	6½-5½	18½	22½	26	29½	48½
Princess	Paper-shell	When 9½	6½	18½	22½	26	29½	48½
Princess	Paper-shell	When 10½	5½	20	23½	28	32	60
Ne Plus Ultra	Paper-shell	10	6	19½	23½	27½	31	56½
King's Soft-Shell	Paper-shell	10	6	19½	23½	27½	31	56½
California Paper-Shell	Paper-shell	11	5	21½	25½	30	34½	71½
Nonpareil	Paper-shell	11-13	5-3	21½	25½	30	34½	71½
Nonpareil	Paper-shell	When 11	5	21½	25½	30	34½	71½
Nonpareil	Paper-shell	When 12	4	23½	28½	33½	37½	87½
Nonpareil	Paper-shell	When 13	3	25½	30½	35½	40½	103

Note.—The weights here given are the results obtained by carefully weighing the samples submitted. The comparative weights of kernel and shell of the same varieties vary somewhat when grown in different localities; in the nuts of the same kind grown on trees of different ages; and also one season with another even when grown upon the same trees.

VARIETIES OF ALMONDS.

A short description of the several varieties is here given.

Terragona, 6½ oz. kernel; 9½ oz. shell. Soft-shell. A Spanish almond imported into the United States in large quantities. Short and thick. Shell thick and inclined to be hard. It cannot be broken with the

fingers, nut-crackers being required. It is to-day the leading and best known variety in the United States markets. The Terragona is the soft-shell almond of the United States; but notice the *value* of it in comparison with the other varieties, based upon its proportion of kernel and shell, as shown in the accompanying table.

Ivica, (?) oz. kernel; (?) shell. Soft-shell (?). A Spanish almond of poor quality as compared with any of the California varieties.

Languedoc, $7\frac{1}{2}$ oz. kernel; $8\frac{1}{2}$ oz. shell. Soft-shell. A standard variety; nut large and kernel sweet. The California almond known to the trade as soft-shell.

El Supremo, $7\frac{1}{2}$ oz. kernel; $8\frac{1}{2}$ oz. shell. Soft-shell.

Drake's Seedling, $8\frac{3}{4}$ oz. kernel; $7\frac{1}{2}$ oz. shell. Soft-shell. A California seedling, originated by Mr. Drake, of Suisun. It is of the Languedoc class; short, plump, with many double kernels.

I X L, 9 oz. kernel; 7 oz. shell. Extra soft-shell. A California seedling, originated by Mr. A. T. Hatch. An ideal almond shape; not over long, with a perfect shell. Kernels, as a rule, single, and of excellent flavor. A very attractive and popular variety for table use unshelled.

Commercial, $9\frac{1}{4}$ oz. kernel; $6\frac{3}{4}$ oz. shell. Extra soft-shell.

La Prima, $9\frac{1}{2}$ to 10 oz. kernel; $6\frac{1}{2}$ to $5\frac{3}{4}$ oz. shell. Paper-shell. A California seedling, originated by Mr. A. T. Hatch. But few double kernels. Long; very much like the Ne Plus Ultra.

Princess, $9\frac{1}{2}$ to $10\frac{1}{4}$ oz. kernel; $6\frac{1}{2}$ to $5\frac{3}{4}$ oz. shell. Paper-shell. The nut rather short and small. Kernel flat and somewhat wrinkled. The shell rather imperfect and ragged. Imported in small quantities from Italy.

Ne Plus Ultra, 10 oz. kernel; 6 oz. shell. Paper-shell. A California seedling, originated by Mr. A. T. Hatch. Rather large and long, having almost invariably a single kernel. The kernel long and slender, resembling the imported Jordan almond.

King's Soft-Shell, 10 oz. kernel; 6 oz. shell. Paper-shell. Originated in San José, California. Short, with a sharp point. Dark color. Shell thin, soft, rough, and somewhat imperfect. Kernel white, large, flat, and wrinkled. Sweet and relishing.

California Paper-Shell, 11 oz. kernel; 5 oz. shell. Paper-shell. Short, with a sharp point. Shell rough and imperfect. Kernel white, large, flat, and wrinkled. Sweet and relishing.

Nonpareil, 11 to 13 oz. kernel; 5 to 3 oz. shell. Paper-shell. A California seedling, originated by Mr. A. T. Hatch. Has invariably single kernels, and is of superior flavor. When grown on young trees the shells are very thin and somewhat imperfect. On account of the large proportion of kernel to the pound of unshelled nuts it is a very desirable variety.

TANNIN PLANT—CANAIGRE.

Various articles on a species of *Rumex* or *Dock*—the canaigre—for tanning purposes, having lately appeared in the papers, many giving conflicting accounts, the subject is deemed of sufficient importance to here describe the plant and all the species with illustrations.

The canaigre is one of the oldest weeds known on the Pacific Coast, being greatly used for different maladies, especially sore throat. The name canaigre, given to this plant by botanists, is a confusion of the Spanish name for it "Caña Agria," meaning sour cane. Of late much has been said and written of its tannic qualities, and many are now turning their attention to its cultivation, especially since an extract factory has been established in New Mexico.

There are several species of *Dock* (*Rumex*) found on the Pacific Coast. *Rumex venosus*, Pursh., is found in dry sandy valleys from British Columbia to Nevada and Colorado. *Rumex occidentalis*, Watson, from Alaska to Sacramento, and eastward to New Mexico and Colorado, and in Labrador, but only rarely collected in California, and has only been found in some of the northern counties, aside from Sacramento, i. e., Shasta, Siskiyou, and Humboldt. *Rumex salicifolius*, Weimann, in the valleys throughout the State and along the coast, ranging northward to Alaska, and eastward across the continent. *Rumex berlandieri*, Meisner, in Colorado, and eastward to New Mexico and Texas. *Rumex crispus*, Linn. (yellow dock), has been collected almost everywhere in the State, along the rivers, creeks, and low lands; grows in pastures and among field crops, and is quite difficult to exterminate. This species is also known by the name of "curled dock." *Rumex conglomeratus*, Murray, originally from Europe, and found throughout the entire length of the State. *Rumex maritimus*, Linn., very common in the moist valleys of Washington, and eastward to New Mexico, and on the Atlantic coast, and in Europe and Northern Asia. *Rumex obtusifolius*, Linn. (bitter dock), European, quite widely spread, and hard to exterminate. *Rumex pulcher*, Linn., a species of the Mediterranean region, found along the moist valleys along the coast. *Rumex paniculatus*, Nutt., in the Sierra Nevada, and northward to Washington, ranging east to Montana and Utah. *Rumex astrosella*, Linn. (red sorrel), a very common and widely spread weed from Europe; spreads very rapidly.

Rumex Hymenosepalus. Torrey.

(Caña Agria—Canaigre.)

Found in dry, sandy places from Colorado, and eastward to Utah and New Mexico. In California, along the Sacramento and San Joaquin Rivers, in the San Joaquin Valley and throughout the southern part of the State, from San Luis Obispo down to Lower California, Mexico, Arizona, New Mexico, Texas, Louisiana, and Florida, and in the Island of Cuba. *Rumex* is the old Latin name known as *dock*, and belongs to the order

Polygonaceæ. A large genus of perennial or rarely annual herbs, sometimes sub-shrubs, rarely tall shrubs, distributed throughout all temperate climates. Flowers fasciculate in the nodes, fascicles axillary or disposed in terminal racemes or panicles. Leaves sometimes all radical, sometimes alternate on the stems and branches. The species are mostly worthless, and in some cases very troublesome weeds. *Rumex hymenosepalus* is the most valuable and greatly used in medicine. It greatly resembles the rhubarb and has often been substituted for it, and the fleshy leaves for spinach. The cane has a pleasant acid taste, almost identical to the stem of rhubarb. It will grow in any locality in the State suitable for the culture of the potato. It requires a loose, moist, sandy soil (and must be irrigated to give the best returns, excepting on moist river-bottom lands). The roots of the cañaigre were used by Indians and others in Texas, in and about San Antonio, for tanning purposes, more than fifty years ago. The roots of the cañaigre are produced in clusters, like sweet potatoes, many being of enormous size. From an analysis made by the Department of Agriculture, and the Arizona Experiment Station, it appears to contain from 23 to 33 per cent of tannic acid. The plant starts its growth very early in the spring and rapidly matures, after which the leaves die; the roots remain in a dormant condition for many months. The roots are of a dark brown color externally, a deep brown color internally, and of a peculiar odor. Both the fresh and the dried roots have a very astringent taste. By the analysis made (here mentioned), the fresh root was found to contain 68.07 per cent of moisture, the tannin equaled 8.51 per cent, or 26.62 per cent when calculated to free water substance. The dried roots containing 11.17 per cent of moisture, contain 23.45 per cent of tannic acid, equivalent to 26.30 per cent of tannin in strictly dry root, and from the close agreement in the tannin estimates in the fresh and dried roots, the tannin was not affected by long keeping.

The analysis made by the Arizona Experiment Station during the different months of the year 1892-3, of dried samples, showed the following per cents:

1892—January 4	16.7
August 2	18.2
September 3	23.1
October 5 (average of new roots from 60 plants).....	23.0
Highest	25.4
Lowest	15.7
November 16	24.4
1893—January 10	25.0
January 17	28.2

On October 15th, a root analyzed in the green state contained 7.4 per cent, and in dried, 22.2 per cent tannic acid. When dug, January 17th, it had a bunch of six small roots, three inches long and one half inch in diameter.

	Weight, in Grams.	Per Cent Tannin in Green Root.	Moisture.	Per Cent Tannic Acid in Dried Root.	Total Weight in Tannic Acid.
Old root	148.3	10.0	71.3	32.0	14.80
New root	39.2	8.9	76.4	15.1	1.52
Leaves and stems.	94.0	0.8	80.0	3.9	0.79

Moisture in Roots.

Green roots, average of all samples.....	66 per cent.
After being sacked two months.....	58 per cent.
After lying in open box one year.....	32 per cent.
Sliced and dried.....	8 per cent.

By which it will be seen that 3 tons of green roots will make 1 ton of cut and dried roots, containing about 30 per cent tannic acid.

Extract in Cut and Dried Root.

Average extract matter.....	45 per cent.
Average purity of tannic acid in extracted matter.....	66 per cent.

By which it will be seen that 6 tons of green roots, or 3 tons of dried roots, will make 1 ton of extracted matter, containing 66 per cent tannic acid, if all loss is avoided.

This tannic acid is of the variety known as rheo-tannic acid, is identical with that existing in rhubarb, and the analysis did not show any substances that would prove injurious to leather.

This important subject naturally suggests itself to intelligent experimenters and as one well worth a trial, for we have the climate and soil adapted to its natural growth, and if the demand warrants its culture, in a few years it could take the place of cutch and gambier, of which something like 20,000 tons are imported annually into the United States.

Propagation.

The habits of the caffaigre are very similar to the rhubarb. It completes its annual growth in a few months; during the remainder of the year only the withered leaves and dry stalks are to be seen above ground. The caffaigre puts forth very early in the spring and, like the rhubarb, it is then that it requires constant care and cultivation to have the plants give the best results, because by May and June their growth is over; the leaves then die down, and the roots lie dormant the balance of the season. The roots, however, being fleshy, deep-seated, and tuberous, are full of moisture, retain their vitality throughout the summer, and start new growth as soon as the rains come on the following winter. The plate herewith given is from the report of the Department of Agriculture for 1868, and while somewhat poor, gives a fair idea of the habit of growth of this plant.

Bulletin No. 7 of the Arizona Experiment Station gives the following account, which corresponds with my observations:

In this locality the plant appears above ground shortly after the winter rains—last year the first of February. It grows rapidly, and by the last of April it is in full bloom. Before the close of the following month it has matured its seeds, and the part above ground has withered and dried. Its annual period of growth only extends over a few months. If we have fall and early winter rains, the plant begins its growth during November and December. The winter of this climate is not of sufficient rigor to destroy the foliage. If the plant starts its growth before the close of the fall months it will continue in growth throughout the winter, and will produce a much thriftier growth before the drought of the succeeding summer. The plant propagates itself mostly by its large fleshy roots. It flowers profusely; but very few seeds are matured, the greater number withering and falling before ripening. We are inclined to think that very few of the seeds that do mature germinate and produce new plants. The seeds maturing in early summer fall to the ground, and for several months lie there the prey of insects and birds. A diligent search several times in as many different places failed to discover a single seedling, and this in regions where the plant was very abundant. Possibly, in a measure, this failure to produce seed may be attributed to the proterogynous and anemophilous condition of the flowers. This is especially true in places where the plants are not numerous. Some two or three days before the stamens are ready to shed their contained pollen, the rather long, three-parted, plumous style curves back at each angle of the achene, the parts projecting between the three inner bracts of the floral envelopes. These bracts only spread as they are crowded apart by the developing stamens.

The flower hangs downward, suspended by the rather long-jointed, filamentous pedicel.

As the pollen ripens the stamens are swayed back and forth by the slightest breeze, and the scattering pollen is carried by the wind to the younger flowers, the stigmas of which are at this time ready to receive it.

The leaves are large, thick, and succulent, as a rule presenting about as much of one surface to the sun's rays as the other. Both surfaces are very similar, the large mid-rib being a little more prominent on the under side. The epidermal cells and the form and number of stomata above are about the same as are found below. The mesophyll is almost entirely of palisade tissue, which has the appearance of a deep, rich green velvet when the epidermis is stripped off.

This plant varies to a great extent, both in firmness and general appearance of roots, and in size and appearance of leaves and stem. In some plants the leaves are broad and smooth; in others, narrow and very wavy margined. In some the bracts of the penanth are two or three times as large as in others and much more highly colored.

Many letters are constantly being received and questions asked regarding the probable returns per acre. This we cannot answer, because no plantations have yet been made in our State. The following from the Arizona Experiment Station at Tucson, where the plant has been largely grown, will no doubt prove of interest:

While the result of our investigations to the present time with such data as we have collected from other sources will not enable us to give positive replies to the many inquiries we receive, enough has been demonstrated to show that the cañaigre plant possesses sufficiently valuable qualities to warrant its cultivation on a large scale.

The amount exported during the past two years shows there is demand, at paying prices, for large quantities, and one of the greatest obstacles in starting an industry introducing a new product to the trade, is largely overcome. There is room for a large industry in growing and shipping the roots in a dried state, but the cost of labor in slicing and drying, and the bulky condition of the product after they are thus prepared, stands in the way of the most rapid development.

The cañaigre crop has this advantage over sugar cane and the sugar beet: it can be prepared for market without expensive machinery for manipulation, but as the field of production is a long distance from places of consumption, economy in transportation demands the extraction of the valuable element and placing it in condensed form. It is important, therefore, that extract factories be established on a large scale, and that they be located on lines of transportation, and where the lands in the immediate vicinity of the works may be planted to cañaigre.

Our investigations in the laboratory, which are simply referred to in this bulletin, and which are still in progress, show that there is no more difficulty in extracting the tannic acid from the roots, green or dried, than in separating sugar from cane and from beets. As in sugar making, the extraction will have to be done on a large scale and with expensive apparatus, but the returns will fully justify the investment.

The industry should be built on two lines, growing and manufacturing, the same as has been found most desirable and profitable in sugar production. Capital must first be secured to build factories, after which there will be no difficulty in making contracts with persons to supply cañaigre roots, at stipulated prices per ton.

Time of Planting.—It seems not to matter seriously when the roots are planted, the formation of new roots beginning in the fall from the latter part of September and continuing on until March or April. If planted in the late spring, leaves will appear and lie down at the usual time in May, when the root planted will lie dormant through the summer and begin the formation of the new crop of roots at the regular season, with no apparent advantage or disadvantage as compared with roots planted just before the growing season. If the soil is kept dry, they may lie over until the next year, and then proceed to grow in the usual way when moisture is supplied.

Under cultivation the habits of the plant may be modified to some extent, and we may find on further investigation that our present conclusions are somewhat in error in regard to the particular habits of growth of the plant.

Time of Harvesting.—With the crop planted in the fall, as has been stated, growth above ground ceases the following May, but the roots, although they remain dormant, grow gradually richer in tannic acid during the year, but the increase is quite slow after July. With rain or irrigation in the fall, the leaves appear above the ground and a new bunch of roots is started; but so far as we have observed, the entire hill will produce no more new roots than would each single tuber if they are separated and replanted. In fact, we are inclined to think the single tuber will produce a larger new crop than the entire hill.

A point we have not yet determined is, whether or not the one-year-old roots increase in size the second year. They certainly grow richer in tannic acid. If they continue to grow, it may be found most profitable to allow the crop to remain on the land two years; if not, the crop had better be harvested when the roots are one year old, and the land replanted.

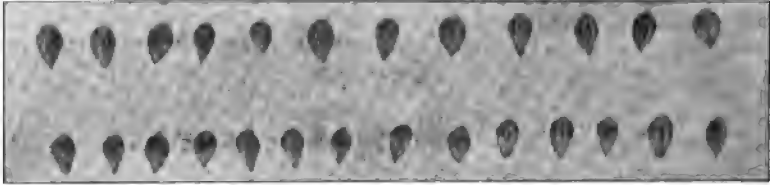
Yield per Acre.—Commencing to irrigate by the first of October, a crop of 10 tons to the acre is a reasonable estimate for new land, if the soil is fairly well prepared, and a good stand is secured by planting selected tubers of wild growth. The second year's crop,

from cultivated tubers one year old, should reach 15 tons, and 20 tons is within the possibilities on good land carefully planted and well taken care of.

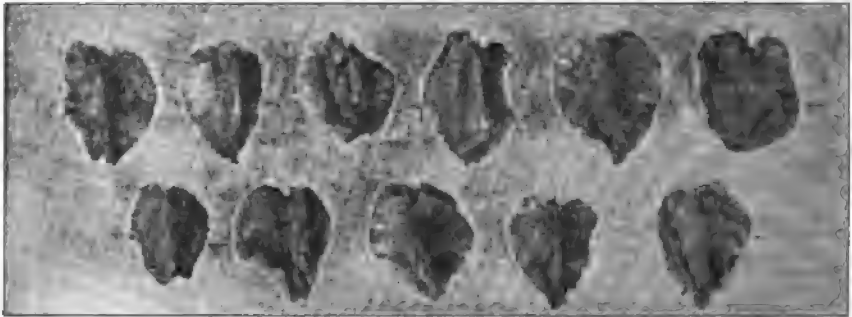
Cultivation.—On new desert land, cultivation of the crop will consist of running a cultivator between the rows after each irrigation. On old land that has become set with weeds, some extra work may be necessary to keep them down, but as the ground is prepared during the summer and the growth occurs in the winter and spring, the ground being shaded during the later stage of growth, weeds will not interfere seriously.

Preparing the Land for Planting.—So far as we can judge of the habits of the plant, the yield of this crop will, like Irish potatoes and some other root crops, be largely governed by the preparation of the soil before planting. With the preparation given to many of our wheat fields before seeding we should not expect over half the crop that might be grown with good fitting of the land before planting.

We have never found large cañaigre roots in close, compact soil, and we find that it does not develop fully on our heavy soils under cultivation unless the soil is well broken and loosened up occasionally during the season of growth.



Seeds of the Cañaigre (*Rumex hymenosepalus*). Natural size.



Dried Bracts, which surround the Seeds of Cañaigre (*Rumex hymenosepalus*). Natural size.

The plant is tenacious of life; it will live under almost any conditions, but it will only produce a large yield of new growth where it finds congenial surrounding conditions. We have set forth the remarkable adaptability of the plant so fully, that we wish to emphasize the above statement so that cultivators may not be disappointed in yield obtained. We know of no crop or plant that will make a large yield without certain requirements, and cañaigre is no exception. With moisture, it will grow as a weed all through southern Arizona, but it will require certain conditions to make a large yield of roots, one of which is well prepared, deep, loose soil, if the soil is not naturally in that condition.

Cost of Growing.—Our experiments in growing cañaigre are on too small a scale to form a base for an estimate of cost of cultivation of large areas. We can approximate the cost very closely, however, from our experience in growing Irish potatoes, a crop which is handled in a similar way.

The ground should be well plowed, the tubers dropped and covered with the potato planter, which, with a little adjustment, will do the work. To secure the largest yield the planting should be done before the first of October and the soil moistened. The crop should be irrigated from four to six times, and some implement of the two-horse cultivator style, with narrow teeth, run through the rows after each irrigation to loosen up the soil.

The potato digger will lift the roots from out of the ground, and this may be rigged with a carrier so that the roots will be dropped on a truck wagon driven alongside, somewhat on the plan of the grain header and the accompanying wagon; and if the digger cannot be rigged to dig two rows at a time, two or more may be driven on either



RUMEX HYMENOSEPALUS (Caña Agria—Cañaigre).



ROOTS OF CASAGRE (*Rumex hymenosepalus*). One-third natural size. This cluster is from one plant.



YELLOW DOCK (*Rumex crispus*). One-third natural size. Cut appended to show the different

side of the wagon used for hauling the roots from the field, the object sought being to exclude all hand labor in planting, digging, and picking up.

With the field cleared, leveled, and put in shape to be irrigated, and seed on the ground, we would estimate the cost of growing somewhat as follows:

Plowing and preparing land, per acre	\$3 00
Planting with machine	2 00
Irrigating and cultivating	8 00
Digging with machine	2 00
Water rental	1 50
Total	\$16 50

Cost of hauling roots from the field would depend on distance to factory or station. Cost of seed is not included, for, as has been stated, the seed roots planted will be harvested with the new growth and are richer in tannic acid than when planted.

This estimate is for growing fields of from 100 acres up, sufficient area to warrant the use of the necessary machinery. On plantations of 1,000 acres or more, stationary and portable tramways, with horse cars, such as are in use on the large sugar plantations in Louisiana and Texas, will be desirable to reduce cost of hauling roots from the field to the factory. With the tramway the plantations may extend several miles from the factory without making the cost of delivery prohibitive.

RHIZOBIUS VENTRALIS.

Since the last report was made, reports have been received from most every section where colonies of the black ladybird (*Rhizobius ventralis*) were placed. Most of them herald the increase of the parasite. In some orchards thousands have been gathered this season and distributed among orchards infected by the black scale. During the months of August and September more than a thousand strong colonies were distributed throughout the State. Besides, a great number of extra large colonies, of several hundred beetles each, were placed in orchards in Los Angeles, Orange, Riverside, San Bernardino, and San Diego Counties. The Entomologist of this Board personally attended to their distribution, and the placing of colonies in the orchards. In all several million have been distributed, and all these insects are the product of about ten perfect pairs originally introduced. The introduction of this insect will prove of untold value, and a great boon to our State, for it has proved to be eminently successful. In the early part of the season many discouraging and conflicting reports were made in the papers, due to the habits of the insect being unknown.

On August 7, 1894, the following Associated Press dispatch appeared in various papers:

POMONA, August 6.—It seems that the black ladybug which was introduced in the Pomona Valley several months ago has been doing satisfactory work for the fruit growers around Pomona. A number were placed on the Mountain View ranch, owned by Col. F. P. Firey, at that time, and did good work against the black scale. In speaking with Col. J. L. Howland, he said that in looking over his ranch he found quite a number on the trees he examined.

The "Pomona Progress" of August 4, 1894, says:

There has been for over a year past such a difference of opinion and diversity of statements of facts regarding the work of the *Rhizobius ventralis*, or black ladybird, in destroying black scale, that fruit growers have not known whether to give the insects a trial in their orchards or not. The officers of the State Board of Horticulture, under whose auspices the black ladybirds were brought to the coast from Australia and propagated and distributed here, have stoutly maintained that the insect would eradicate the black scale from Southern California in time, and have already done so in one or two large orchards, notably Ellwood Cooper's large olive orchard at Santa Barbara.

Many colonies were distributed by the State Board of Horticulture throughout Southern California last fall, a dozen or two being placed in groves in this valley. As no one had been able to find any trace of the bugs after they were liberated on the trees, nearly everybody supposed they had died or disappeared and would accomplish nothing, and some papers have so stated several times. Recently Alexander Crow, Quarantine Officer of the State Board of Horticulture, with W. E. Collins, Commissioner of San Bernardino, and a local horticultural officer, inspected several orchards in Pomona. One was the olive grove of J. L. Howland, who like others had not been able to find any trace of the insects since they were put upon his trees. By spreading a white sheet under the trees and shaking the latter the officers found large numbers of the insects on the trees, and discovered on close examination that they were destroying the black scale. A visit to George F. Ferris' orchard disclosed the same state of facts, and all were convinced that the insects were propagating satisfactorily and doing the work for which they were brought to this country.

When it is considered that the first black ladybirds—a consignment of ten pairs only—were brought to this country in 1892, their propagation and work on the black scale here is encouraging. Mr. Crow says observation leads him to recommend the liberation of colonies on olive trees, leaving them to extend their range in a natural way to other sorts of trees. He finds that colonies so started thrive much better than those started

on citrus trees. In Santa Clara County he finds several colonies doing excellent work on the brown apricot scale. On the whole he has no question of the value of the insect in its effects upon the black scale, black amut, and the brown apricot scale. Already in Mr. Cooper's orchards they are saving an annual outlay of between three and five thousand dollars, besides an infinitely greater loss in preservation of the vitality of the trees and in their better fruitfulness.

Prof. T. N. Snow, Horticultural Commissioner of Santa Barbara County, in a letter to the "Santa Barbara Press" of August 26th, says:

On the 22d instant, I went to Mr. Hemenway's place (where a colony had been placed) for the fourth time this month, and from eight trees gathered more than one thousand ladybugs. From one tree I obtained two hundred and fifty in fifteen minutes, and the whole cañon was alive with them.

The following is from the "Azusa Pomotrepic" of August 23d:

Interest in the success of the ladybirds, which now seem to be giving the black scale a great deal of worryment, is unabated, and since Mr. Cooper's letter, which is given below, was written, similar reports of their efficiency come from various localities. Unlike the *Vedalia*, which worked efficiently under all circumstances, the *Rhizobius* seem to require shade and shelter to do good service. The new scale destroyers are being given a fair trial by officials and orchardists, and may yet prove efficacious when they become acclimated to brave the vicissitudes of heat and cold. The following is Mr. Cooper's letter written to W. R. Barbour, of Covina, advising him of efforts being made to disseminate the *Rhizobius*:

"I send you by this mail a package containing a colony of ladybirds (*Rhizobius ventralis*). A few of these beetles, probably not more than ten perfect pair, were placed in olive orchards badly infected with black scale (*Lecanium oleæ*), on May 15, 1892. In September, 1893, they had increased to many millions. The orchards at this writing are entirely free from scale insects. Over five hundred colonies were sent out last fall. Reports from some who received them are very encouraging and satisfactory, while from others no apparent benefit has been derived—statements are made that no ladybirds or their larvæ can be found.

"I have visited a number of orchards where colonies were placed, and have made this observation: That, in every case where there are good sized trees, very bushy, offering protection to the beetles, and there were plenty of scales, good work had been accomplished. The beetles and larvæ in all stages were plentiful on the surrounding trees, so that this summer the parasites will surely complete the destruction of the pests.

"In orchards where the trees were small and very open, it had not been so successful—but few beetles or larvæ could be found, and there was not much hope of success. Therefore, you will place this colony on a tree very dense in foliage, where there are plenty of scales, and no spraying or fumigating must be done in the orchard."

Edward L. Koethen, of Riverside, in an article in the "Riverside Press" of August 30th, says:

It may not be known to all our growers that during the summer of 1893 the white cottony scale gained ground so rapidly in certain orchards that for nearly three months of the year the entire force of inspectors was required to inspect and reinspect the infected orchards, to the exclusion of very much necessary work on other ranches, where the red and other scales needed the attention of the inspectors, and the appropriation was insufficient to justify the employment of more inspectors, so that at the end of the season it became apparent to our Commissioner, Mr. House, that some other policy was a necessity.

Then came the assurance of the members of the State Board of Horticulture that the *Vedalia cardinalis* could be depended on to make of the white scale a harmless enemy. This advice was reluctantly accepted as the only resource. It was some time in February that the first colony (about twelve bugs) of the *Vedalia* was placed in a tree containing quite a number of the white scale, and only a few weeks elapsed before they had multiplied sufficiently to get colonies from this tree to place in other orchards. The result is that this beautiful little ladybird has gained an established foothold in the valley, and they have been found in adjoining orchards from the ones where they were colonized, as far as a quarter of a mile from the original colony, hard at work, devouring their natural food, the cottony scale. So that the experiment now seems to be an assured success, and all the orchardist who finds white scale on his trees has to do is to apply for a colony of *Vedalia*.

As to the black scale, this is one of the most serious pests we have to contend with at this time. It has gained a firm foothold, not only on citrus, but on other trees, and would be impossible to eradicate without the aid of nature. It seems that the increased acreage of irrigated land has imparted to our atmosphere a certain amount of moisture, that has made it more like that of the coast, and hence favors the development and perpetuation of the black scale, and as our trees become larger and closer, the tendency is

likely to increase. The *Rhizobius ventralis*, another Australian ladybug, seems to be the only other source of permanent relief. It is a little black bug about the size of a black scale, having a dark brown spot on each wing, its natural food in this country being the black scale. It has already done good service in some localities in cleaning up smutty orchards, but its success has not been uniform, being erratic in its nature.

To illustrate: Mr. Barney received a colony last fall, which was placed in some Tangerine trees, where abundance of food seemed to be present, but as yet bugs have not appeared in sufficient numbers to be encouraging. On the other hand, it is only about six weeks since a colony was placed in a tree in Mr. Gilbert's orchard, and now the bugs may be seen there in all stages of development, and give promise of rapid multiplication. This is the first promise of success with this insect in Riverside, but no results can be expected for another year. In the meantime it is the policy of the Commission to advise growers to spray all trees that are sufficiently infested to smut the fruit of the next picking, the idea being that it will be cheaper to spray than to wash fruit. However, all growers should be cautious not to spray the trees near ones where colonies of *Rhizobius* have been placed.

In the "Santa Paula Chronicle" of August 24th appears the following letter:

Editor "Chronicle": I recently examined the orchards where the new black ladybirds are breeding, to see if the beetle had increased enough to distribute colonies, and found plenty of larvæ but not many beetles. The beetles probably spread out over the orchard as soon as they are able to fly, which will make it longer before we can collect them to advantage than I anticipated. Mr. Cooper writes me that he has just examined the orchard where I collected the ladybirds, and was astonished at the result. Ten thousand on each large tree would be a low estimate of their numbers. He will send out more colonies next month, and I advise those wanting them soon to write him for a colony.

J. F. MCINTYRE,
Horticultural Commissioner.

The following is from the "Riverside Press" of August 25th:

Professor Woodbridge of Los Angeles reports that the colony of *Rhizobius* which he located in his orchard have not only done wonders in destroying the black scale, but he is convinced are doing good work upon the red. He finds that they have bred rapidly, and thinks the trouble with colonies placed in the San Gabriel Valley is that they were moved late in the season, and the birds and the cold weather combined may have destroyed them. He is quite sanguine that this black ladybug will yet prove as efficacious as spraying or fumigating to clean our orchards, and far less expensive. We sincerely hope his views will prove correct, and advise our local orchardists to obtain colonies of this scale-eating bug, and see that the best conditions are afforded them.

At the last meeting of the State Board, President Cooper reported having visited most of the sections where colonies of the *Rhizobius* had been sent. He said that, in every instance, he had found the ladybugs, but that on trees with heavy foliage, affording shelter, they were more plentiful; that the insects had already saved growers thousands of dollars. More than a thousand colonies have been distributed, and in another year they should be found throughout the State. The investigations made by the Entomologist of this Board prove substantially the same. The insect being a new one here its habits were unknown, and while present in various stages were passed unobserved, and thus conflicting reports were made.

A few reports on the increase of the *Rhizobius ventralis* are herewith appended (although many more are on file), to show how they have multiplied in places other than where they was first colonized, as follows:

SAN BERNARDINO, CAL., September 10, 1894.

B. M. LELONG, Secretary State Board of Horticulture:

DEAR SIR: Last fall I received a few *Rhizobius ventralis* from Mr. Cooper, and this spring I reported to you that they had probably perished, as nothing was to be seen of them, nor was there any apparent diminution of the black scale.

I write now to amend this report in the light of further experience. I placed the insects on a large vine of *Periploca græca*, which runs over my house, and which was

very firmly packed with them. I am now unable to find any living scale on the vine. Five or six hundred feet away is a large tree of the Chilean *Maiten*, which was also badly infested with black scale, many twigs being killed and the foliage blackened with their excrement. This tree is now nearly free from scale, although they can yet be found on it in several stages of growth. The foliage is but little blackened, and there is a vigorous new growth, showing returned health. These are the only badly affected plants I had. There was a little scale on some apricots, and these still have some on. * * *

Very truly yours,

SAMUEL B. PARISH.

SANTA MARIA, June 6, 1894.

B. M. LELONG, Esq.:

DEAR SIR: W. W. Stillwell got *Rhizobius* from Ellwood Cooper last October. I find they have survived the rough weather and are now at work, with some larvæ appearing. I think they will be a success.

JAMES HUSTON,
Horticultural Commissioner.

LOS ANGELES, June 30, 1894.

B. M. LELONG, Esq.:

DEAR SIR: *Rhizobius* increasing rapidly; prosperous and happy.

E. BONTON.

LOS ANGELES, CAL., December 7, 1893.

B. M. LELONG, Secretary State Board of Horticulture:

DEAR SIR: The colony of *Rhizobius ventralis* has increased incredibly, and has almost subdued the black scale in my deciduous orchard. I am happy to report its efficiency. Very gratefully,

R. D. LIST.

SANTA CRUZ, CAL., June 26, 1894.

Mr. B. M. LELONG:

DEAR SIR: Your kind favor at hand and noted. In reply, will say that the ladybugs sent us last year have been a great success. We have been scattering them among our neighbors, and the bugs seem to be just the thing to clean out the scale. Thanking you for past favors, etc., I am,

Yours truly,

A. G. ROSE.

SANTA BARBARA, CAL., July 17, 1894.

Mr. B. M. LELONG:

DEAR SIR: Answering your card of June 22d, as to ladybirds (*Rhizobius ventralis*) which prey on the black scale (*Lecanium oleæ*), I report:

I have but few citrus trees, and until some eighteen months since I had but little trouble with any kind of scale. During my absence of some months last winter and spring my premises were in charge of others, and on my return I found that my orange and some of my ornamental trees seemed to be alive with the black scale. The tender and small branches of some of my trees were so thickly covered with the scale that there seemed to be no room for more. I applied to Mr. Ellwood Cooper for the *Rhizobius*, and he sent me two or three colonies, which I put upon one of my trees, and after some six weeks I found all my trees thoroughly free of the black scale. Some of my neighbors have supplied themselves from my trees. I have made no other effort or experiment with the *Rhizobius*.

Yours truly,

E. B. HALL.

SAN DIEGO, CAL., July 25, 1894.

Mr. B. M. LELONG:

DEAR SIR: Since writing you in regard to the *Rhizobius ventralis*, I have made a further and most systematic search, and find that parasite has increased to a remarkable extent. The closest scrutiny is necessary for their discovery, as a great many of them appear to be much smaller than the original bugs. Another remarkable feature is that they are preying almost entirely on *A. rapax* and *M. citricola*, doing magnificent work against these pests, hardly touching the black scale. I am in hopes they will continue to multiply, and after they have cleaned out the former, will commence on *L. oleæ*.

Very truly yours,

W. R. GUNNIS,
Horticultural Commissioner.

SAN DIEGO, CAL., July 17, 1894.

B. M. LELONG, Esq.:

DEAR SIR: I returned home after an absence of many months a few days ago and received your postal card notice. I looked my olive orchard thoroughly over and found that the ladybugs have done their work well. Nine tenths of the black scales, which were very numerous, are now dead. The trees were not disturbed by spray or otherwise after the colony of ladybugs was placed upon them last year.

The ladybugs are not as numerous in the orchard as I would like to find them. In looking over the orchard I found two dozen, but their work has been done thoroughly.

I am, yours very truly,

A. A. MULLOY.

NAPA, June 17, 1894.

Secretary State Board of Horticulture:

DEAR SIR: I received from Mr. Cooper at Santa Barbara, October 2, 1893, a colony of ladybirds (*Rhizobius ventralis*), with request that I report progress and increase of same to you. They have not apparently spread to any great extent, but have certainly increased in the immediate vicinity of the tree on which they were first placed, as I find many active larvæ at work, and the scales are certainly disappearing on a few olive trees around the original colony, though the scales are increasing alarmingly on the rest of the orchard. I find more larvæ than bugs, which I rarely see. Will watch and wait and report further progress.

Respectfully,

GEO. DUHIG.

NORTH ONTARIO, CAL., June 16, 1894.

B. M. LELONG, Esq., Secretary State Board of Horticulture:

DEAR SIR: October 6, 1893, I received a colony of twenty-five *Rhizobius ventralis* and placed them as directed. March 10, 1894, I found three full-grown *Rhizobius* in my orchard. April 23, 1894, I found at least sixty larvæ, some of which were at least forty rods from where they were originally placed. May 5th, found one half-grown bug. To-day (June 16th), I discovered one larva of the *Rhizobius* ravenously devouring black scale. I watched it through a microscope for about thirty minutes. * * *

My orchard is badly infested with black scale, but I feel confident that the *Rhizobius* will clean it out in time if left alone; therefore I do not want to fumigate or spray. * * *

Respectfully,

GEO. BARLOW.

SANTA BARBARA, CAL., July 2, 1894.

B. M. LELONG, Esq., San Francisco, Cal.:

DEAR SIR: Your card of June 22d, asking for a report on the *Rhizobius ventralis*, which I colonized last year, came duly to hand. On June 8, 1893, accompanied by three gentlemen, I went to Ellwood, and through the kindness of Hon. Ellwood Cooper, we were taken to his olive orchard. He showed us the ladybird and its larvæ, and we gathered about seventy specimens. In dividing I took about twenty-five, and that night I placed them in a small lime tree (five feet high and nearly as broad, with dense foliage), which was literally covered with black scale from the ground to the leaves.

In July, 1893, I went again in company with Benjamin T. Hayne, of Montecito, and we obtained about forty specimens. My portion I shared with my neighbor, Paschal Hacker, whose garden adjoins mine, and what I had left I placed on an olive tree which had but little foliage.

In the autumn Mr. Crow sent me a colony of twenty-five, which I placed on a lemon tree badly infested with black scale. The foliage was not dense, but yet quite full of leaves. For twelve months I looked for results. The lime tree became well nigh cleaned of scale and smut, it bloomed and bore good clean fruit for the first time; the bark looked as if washed with soapuds; but I saw no sign of *Rhizobius* except once, when I found one on my hand. The olive tree and the lemon did not appear to be much if any improved. On June 8, 1894, Mr. Ellwood Cooper came to inspect my colonies. With the aid of his "hunting tackle" we found the *Rhizobius* (both beetle and larvæ) on the lime tree and the lemon, but none on the olive. In larger orange trees of dense foliage, situated at considerable distances from those on which I placed the colonies, we found both the beetles and larvæ in greater numbers. (My grounds contain $1\frac{1}{4}$ acres, and Mr. P. Hacker's about $1\frac{1}{4}$ acres.) These larger trees are by no means clean, although a few feet off they appear so. In fact, strangers coming into my place remark, "How clean you keep everything." But I know where the "evil ones" live; and I live on, or in, the hope, yes, the expectation, that this summer I shall raise a million specimens of the *Rhizobius*, that will rid my garden of black scale. I have about one hundred and thirty lemon trees, twenty orange trees, a few limes, and some pepper and other ornamental trees, which are agreeable nesting-places for the black scale, and if I can breed a million beetles this year, my neighbors and others in and throughout the county shall have the benefit in the near future.

I believe the *Rhizobius* will prove a success; but trees of thin foliage will be longer in showing improvement.

Yours, very respectfully,

T. N. SNOW,
Horticultural Commissioner.

Prof. A. J. Cook, of the Pomona College, recently of the Michigan Agricultural College, an economic entomologist of the highest repute, visited Santa Barbara and made a careful investigation of the work accomplished by the *Rhizobius ventralis*, and the following is his report, as published in the "Los Angeles Times":

While attending the Farmers' Institute at Santa Barbara last week—September 6th and 7th—I learned, through the wide-awake and competent Fruit Commissioner of Santa Barbara County, T. N. Snow, that six miles north there were citrus orchards that had been entirely freed of the black scale (*Lecanium oleæ*) by some of the last imported ladybird beetles. I arranged at once to visit these orange orchards, and early next morning, in company with Messrs. Wright, Howland, and Packard of Pomona, and Mr. Snow of Santa Barbara, proceeded first to the orchard of M. C. Hemenway, where had been introduced fifteen of the ladybird beetles last October. This orchard, which consists of orange and lemon trees, was very dirty with the fungus which always disfigures scale-infested trees, and the carcasses of old last-year scales were exceedingly abundant. Upon close examination it was found that there were almost no young scales. An occasional young black scale (*Lecanium oleæ*), and in one place several soft brown scales (*Lecanium hesperidum*) were, after long looking, discovered, while the little beetles were exceedingly abundant. Each of the party secured several hundred to take away, that they might continue the good work of devouring the blighting scale in other orchards. This was to me an exceedingly interesting object-lesson. I had read how the *Vedalia cardinalis* had cleaned out the cottony cushion scale, and here saw how even the more destructive black scale had been devoured by the later importation from Australia.

The principal agents which had been so beneficial to Mr. Hemenway proved to be *Rhizobius toowoombeæ*, a small, black beetle with brown head and thorax; *Rhizobius debilis*, which is about the same size as the other, but is entirely black above and below, and the *Rhizobius ventralis*, which is larger, entirely black above, with short, light hairs and brown below. The first mentioned were much the more abundant. One half mile west of Mr. Hemenway's orchard is the citrus orchard of C. R. Hails, and between this and the other an orchard belonging to an Indian woman. Into the former five ladybirds were introduced last autumn, but into the latter none had ever been introduced. I carefully examined both orchards, and found innumerable ladybird beetles and almost no scale, though the signs of their devastating presence last season were no less apparent than in the orchard of Mr. Hemenway. On Saturday, the next day, Messrs. Howland and Packard, of Pomona, Mr. and Mrs. Thompson, of Pasadena, Dr. Woodbridge, of Los Angeles, and myself visited the 1700-acre estate of Hon. Ellwood Cooper, of Ellwood, fourteen miles northwest of Santa Barbara, where the beetles were first introduced, and where they have been watched very carefully by Mr. Cooper, to whom, more than to any one else, we are indebted for these saviors of the orchards of California. We first visited the large olive orchard where the beetles were originally introduced. Mr. Howland, himself a large olive grower at Pomona, saw this orchard two years ago. He said the transformation was most marvelous indeed. Two years ago it was filthy with the secretion of the black scale, crowded with millions of these terrible pests, and he thought utterly ruined. Now it was clean, bright, and vigorous. We could find no living scale, and only one of the little benefactors, which we found after repeated trials. It had evidently remained behind to clean up the few remaining scales, which we were unable to find.

We next visited a large walnut orchard, and here also found *Rhizobius debilis* and *R. toowoombeæ* hard at work, in force, cleaning out the aphids. Mr. Cooper next took us to a fifty-acre orchard of olives, where rhizobiids were introduced last October, and which at that time was suffering fearfully from the black scale. The beetles were introduced at one end of the orchard and are now just completing their blessed work at the other end about one half mile distant. We could see the altered foliage and renewed vigor, while many rods away. Upon examination, we found the little beetles in countless multitudes, and the scales nearly gone, while at the end of the orchard where the beetles were first introduced, which I carefully examined yesterday (September 17th), there are almost no scales or beetles. To show the importance of this, Mr. Cooper tells me that he used to spend from \$3,000 to \$5,000 annually in spraying this orchard, and even then the results were far from satisfactory—not to be compared with the work of the rhizobiids. We found all the species taken in the other orchards, but the *Rhizobius ventralis* was by far the most numerous. Mr. Cooper thinks this the most effective enemy of the black scale. In two hours, the time at our disposal, we secured thousands of the beetles to take away with us. Mr. Packard said he would engage to secure a peck if he could be given three days to do it in. Indeed, Albert Koebele, to whose skill and efficiency California owes both *Vedalia* and these later-introduced benefactors, estimated that a single pair of rhizobiids could produce 15,000,000,000 in a single year. No one can visit Mr. Cooper's place and not be convinced that his estimate is a reasonable one.

Returning to Claremont I introduced the thousands of beetles I secured in the Omstead olive orchard, two miles east of Pomona; in the orange orchard of Mrs. Loomis at North Pomona, and in the olive orchard of Rev. Mr. Loop of Claremont. The insects secured from olive trees were placed on olive trees, and those taken from orange trees were put on orange trees. In every case they were put on trees with thick foliage, which were infested with black scale. I counted 189 young vigorous scales on a single olive leaf,

and in each case introduced on trees near by trees of the other kind. Thus the olive was close to orange and vice versa.

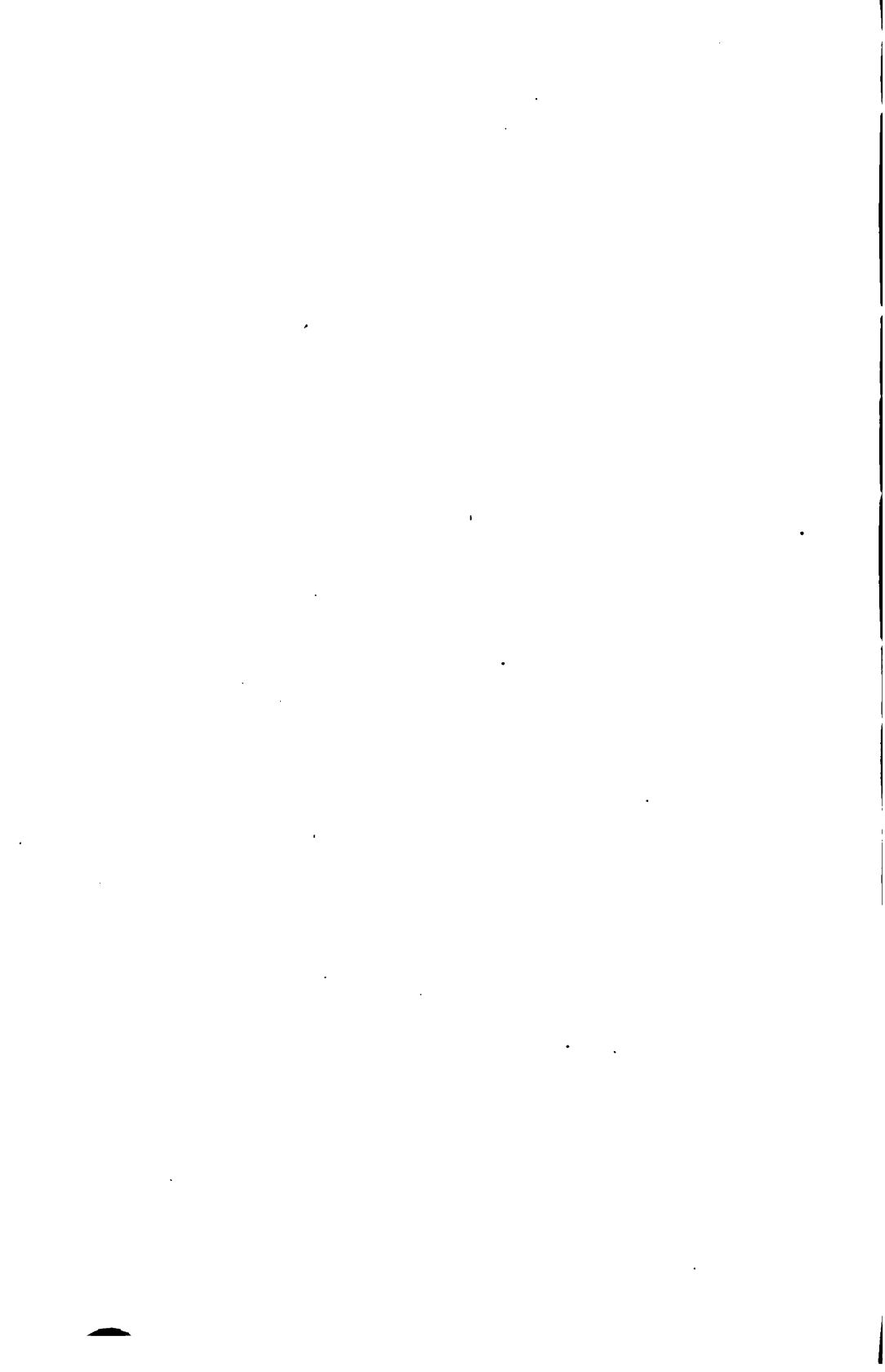
I next visited orchards where colonies of the beetles had been introduced in small numbers some months ago; among others the orchards of Messrs. G. F. Ferris and Drehr of Claremont, and of Mr. Howland of Pomona. In the two former I could find no beetles, but in the latter the beetles were present and breeding, which shows that it is not any climatic peculiarity that has destroyed them. It may be that only males or unmated females, or females that had laid all their eggs, were introduced. More likely birds or lizards had eaten them up. I suggested to the Claremont fruit growers that it would be more than wisdom to introduce many of the beetles in a single orchard, and nine gentlemen at once acted on the suggestion and engaged me to come immediately and secure more of these tiny friends. I worked in the large Cooper orchard all of one day and secured several thousand of the beetles. I shall take as many from the orange orchards before mentioned. These will be liberated in olive and orange orchards at Claremont. I found Alexander Craw, the entomologist, hard at work at Mr. Cooper's collecting and sending out the beetles. I feel certain that he had 100,000 caged ready to be distributed. These are to go to all parts of the State.

I have been a hard student of entomology for thirty years, and I am free to say that it is the wise and certain policy for this great fruit State to keep Mr. Koebele in Australia for some years in hunting and shipping to us more of these natural aids in fighting our insect foes.

Again, why will people spray or fumigate when we can get so easily the *Vedalia* and these rhizobiids? I saw an orchard in San Bernardino County in process of being fumigated only a few days since because a few cushion scales (cottony) were found on a single tree. This seems to me arrant folly, if not worse. Mrs. Cooper has a lovely flower-garden, which is a delight to all visitors who love flowers. Such lovely acacias! Once they were a prey to the white scale. Now, thanks to the *Vedalia*, they are absolutely clean. The lemons, oranges, limes, abutilons, oleanders, olives, pittosporums, habrothamnus, etc., were likewise foul with the black scale, in spite of all effort to keep them clean by spraying. Now, likewise, they, thanks to the rhizobiids, are entirely clean and thrifty. Need I say that Mrs. Cooper shares her husband's enthusiasm regarding the benefits of these ladybird beetles?

A. J. COOK.

REPORT
OF
ALEXANDER CRAW,
Quarantine Officer and Entomologist.



ENTOMOLOGY AND HORTICULTURAL QUARANTINE.

Report of ALEXANDER CRAW, Quarantine Officer and Entomologist.

To the honorable the State Board of Horticulture:

GENTLEMEN: I herewith submit to you my report for the past six months. As formerly, all steamers and sailing vessels arriving at this port and likely to have plants or trees on board, have been inspected on arrival. When trees or plants were found infested with insects or diseases hitherto unknown in this State, they have been immediately destroyed, as, by Rule V of your amended regulations, they are prohibited from landing. This is a very important rule, as it reduces to a minimum the danger of introducing new pests. All other trees or plants have been dipped or fumigated, as set forth in Rules VIII and IX, unless when found, after careful examination, to be absolutely clean. Such plants as raphis and sago palms are uniformly free from pests on arrival, nevertheless each shipment is inspected, as the latter palm is subject to the attacks of coccids. The imports were lighter than for corresponding periods covered by my former reports. Japan, as formerly, furnished the greater portion of the stock. The other countries mentioned in my last report also contributed their quota. Shipments of trees and plants have arrived by rail from the Eastern States, also from England, Germany, France, and Belgium. The Southern Pacific Railroad Company and Wells, Fargo & Co. keep us advised of the arrival by rail of all trees and plants from outside the State. The only way that plants can now enter the State without inspection is through the mails. Most of the stock that comes through in this way are small flowering plants, such as roses, etc., so there is not so much danger to the fruit interests. Still, it is a well-known fact that some of the most destructive tree pests are sometimes found upon such plants. Mail matter can be inspected by the postal authorities on its arrival in this country when it is suspected to contain dutiable articles, and the National Government would thereby be defrauded out of a few cents or dollars customs dues. The introduction of an infested plant into a horticultural or agricultural district would mean individual loss to the residents of that section and entail a hardship upon posterity. Massachusetts has expended over \$300,000 within the past three years in an effort to stamp out the "gypsy moth," that was introduced a few years ago in a very simple manner from Europe. A few caterpillars or pupæ of this moth are liable to be introduced on mailed plants, so the Government should extend to California and other States of the Union (that so desire) the right to protect themselves against pests as they do against disease (in ordering all mail matter disinfected during the prevalence of an epidemic). The stringent quarantine regulations against insect pests and plant diseases adopted by the Cape Colony of South Africa, March, 1893, have been already referred to.

At the meeting of Northwestern fruit growers, held at Spokane, Wash., in February last, a committee from Oregon, Washington, Idaho,

and British Columbia was appointed to draft horticultural laws and quarantine regulations for their respective States. It was agreed that California's experience in this line should be taken advantage of, and similar bills be presented for adoption by the Legislatures of these States.

The colony of Western Australia in May last adopted your rules and regulations in full; the only change made was in the name of the country. Now comes South Australia with regulations that should prevent the introduction of new insect pests into that colony. There are but four rules, but they appear to cover the ground very effectively. The following is the full text:

1. That no growing plants or portions of growing plants of any kind may be introduced from any country without written consent of the Minister of Agriculture being first obtained upon a certificate given by the Director of Botanic Garden, to the effect that the plants proposed to be introduced are either novelties or such as are usually introduced by nurserymen, and that in his opinion there is no danger in importing same.

2. The importation of rooted grapevines from any country, and of fruit trees from any phylloxera-infested country, is prohibited, except that (a) trees and plants, not being grapevines, that have already been ordered, may be introduced up to June 30, 1894, upon proof being given, to the satisfaction of the proper officers, that such trees or plants were ordered prior to date of proclamation, and also that such plants, etc., shall be subjected to immersion in some insecticide, and that all boxes and packages in which such plants are introduced shall be at once destroyed by fire; (b) The Director of Botanic Garden may introduce new fruit trees and grapevine cuttings, but they shall be kept in a closed house in the Botanic Garden for twelve months at least.

3. The Director of Botanic Garden to be allowed to introduce any plants from any country not infested with phylloxera, except rooted vines.

4. All growing plants (or portions) introduced into South Australia shall be first delivered to the proper officer in Adelaide, and remain unopened in original packages until examined, and, if necessary, treated by him.

It was also decided that the utmost publicity be given the regulations by advertisement and by posters in the other colonies, as well as in South Australia.

In an editorial on "Quarantine against Injurious Insects," on page 208 of the February (1894) number of "Insect Life," published by the U. S. Department of Agriculture, Division of Entomology, occurred the following:

So far as we know, California took the lead in regard to this matter of quarantine, and if this State succeeds in making its measures in this direction effective, it will deserve the gratitude of the fruit growers of the entire country. The importance of such regulations in certain other States can hardly be overestimated, and Florida in particular needs some such quarantine law.

I quote the foregoing to show that your efforts to protect the State from new pests and diseases are looked upon favorably by other countries.

Some of the beneficial insects introduced by the efforts of your Board to prey upon the injurious scale insects that have been introduced into this State in past years, have exceeded my most sanguine expectations. The black ladybird (*Rhizobius ventralis*) will prove to be as valuable as the *Vedalia cardinalis*. From the few that Mr. Cooper established at Ellwood, in May, 1892, he has distributed nearly eight hundred colonies to different portions of the State. I have carefully noted the progress and work of this beetle, and am convinced that it will keep all scale insects of the *Lecanium* family in check. The olive orchards at Ellwood, in which were collected nearly five hundred colonies in October, 1893, are now entirely free from the black scale. The older orchards, near Mr. Cooper's house, that were colonized in October, 1893, are now free

from scale, but owing to the failure of late spring rains the black fungus still remains upon the trees, but this, too, will disappear. This ladybird represents to Mr. Cooper alone an annual saving in spraying of from \$3,000 to \$5,000.

Full instructions as to how to care for the beetles were sent with each colony; but it is grievous to note the failures of some of the recipients, who had divided up the colonies instead of placing them all upon one tree, as directed. Others had expected that the colony should have cleaned out in a few months a pest that had been increasing for years. I am positive that but few of the colonies that have been sent out will prove failures. One instance in proof of this was when I visited an orchard in Alameda County, in March, with Mr. Barry, County Commissioner. We found the larvæ fully a mile from where a colony was placed in October, 1893. In company with Messrs. Collins and Scott, I visited orchards in the vicinity of Pomona where colonies had been placed, and the owners had reported that the ladybirds had all disappeared, and found them increasing and spreading through these orchards. Of course, very few know how to look for such insects, but if they will only have a little patience their work will show. I also noticed that where colonies were placed on olive trees infested with black scale the colonization was more successful. When at Ellwood, in June last, Mr. Cooper called my attention to the fact that the *Rhizobius ventralis* also feeds upon aphids. On English walnut trees infested with *Aphis juglandicola*, the beetles and larvæ were at work on this aphid. Mr. Scott of Los Angeles also reports that he found them feeding upon the orange aphid (*Siphonophora citrifolella*) at Duarte. This is all very encouraging, as it insures the preservation of this beneficial insect to the State. Mr. Cooper had seriously considered the advisability of colonizing the black scale upon olive trees in nursery row on his place in order to furnish food for the *Rhizobius* and keep them on his property.

Another ladybird, *Rhizobius debilis*, has increased at Mr. Cooper's place since last fall, and is doing good work. This beetle is smaller than *R. ventralis* and slightly larger than *R. Toowoombæ*, and preys upon the black scale. I also found the *Vedalia cardinalis* and the *Novius Koebelei* upon lemon trees that were very slightly infested with the cottony cushion scale (*Icerya purchasi*). It is remarkable how these ladybirds exist, as there has been very few cottony scales for the past two years for them to feed upon at Ellwood.

Under your instructions I visited the Kercheval orange orchard at Los Angeles, on June 25th, and investigated the condition of the steel-blue ladybird (*Orcus chalybeus*). While this beetle has spread and done fairly good work against the red scale (*Aspidiotus aurantii*), I would still advise that they be not distributed for the present. In a recent letter from Mr. Koebele (now in Queensland collecting beneficial insects for the Hawaiian Government), he informs me that he has discovered an internal chalcid parasite preying upon the red scale in that country, and that he will endeavor to introduce them into California. I have to report receipt of several small packages of ladybirds, and other beneficial insects, from Mr. Koebele, that have been liberated upon scale-infested trees.

While visiting Rivera, Los Angeles County, I discovered a very minute but very important ladybird in great numbers, feeding upon "red spiders." The orange and lemon trees showed evidence of having been

seriously infested with spiders, but at the time of my visit very few were left. I collected colonies of the larvæ, pupæ, and beetles for colonization in other districts. The perfect beetle is only one and one fourth millimeters in length, jet black, but sparingly covered with short silvery hairs on the elytræ and thorax. They are very timid and drop with the slightest disturbance of the leaf on which they are searching for spiders. Like other species of coccinellidæ, the larvæ are the most voracious, and not so timid as the perfect beetle.

From the coast counties south to San Luis Obispo and north to Mendocino, also from the counties adjacent to the bay and bordering the lower Sacramento and San Joaquin Rivers, we have received numerous specimens of a destructive little beetle, *Phleosinus dentatus*. The female beetle burrows through the bark of the Monterey cypress (*Cupressus macrocarpa*) and cuts a vertical channel through the sap-wood five inches in length and one sixteenth of an inch in width, along each side of which and next to the bark the female cuts a small notch, into each of which she deposits an egg; each burrow contains an average of one hundred eggs. As soon as the larvæ hatch they cut a burrow at right angles from the parent channel. When numerous the death of the tree is certain, as the sap-wood and bark are destroyed. The beetles frequently burrow into the young branches and twigs, causing them to die or break off. Like other borers, this is a difficult one to fight, as it is impossible to reach them with the ordinary washes. As a spray I would advise the use of Paris green, one pound to two hundred gallons of water. In a barrel dissolve six pounds of fresh lime in ten gallons of water, and after the lime has settled add the water to the Paris green solution; keep the solution constantly stirred, and apply to the foliage and trunk with a fine spray. The use of a repellant wash would also be useful in preventing attack. One thorough spraying with whale-oil soap, one pound to five gallons of water, in the spring, will keep the beetles away and prevent injury to a valuable specimen of this popular evergreen.

A small black beetle with red legs (*Blapstinus rufipes*) was reported by County Commissioner Motheral of Hanford, on May 3d, as seriously damaging the grapevines in San Joaquin Valley. They work at night. He found a spray of one pound of Paris green to one hundred and fifty gallons of water to be effective. His observations convinced him that they delighted in a dry soil to burrow in during the day, and that after a thorough irrigation they were not so troublesome. I also received specimens of this beetle from Los Angeles and Riverside Counties.

Another black beetle, but larger (*Eleodes quadricollis*), was also reported by him, but the same treatment answered as a check to it.

Mr. John Scott, County Commissioner of Los Angeles, made a most opportune find in his county last February. This was a new and very serious scale pest, *Pollinia costæ*, of the olive. It is a small light-colored scale that clusters in thick patches over the large branches and twigs of the olive. From the appearance of the specimens sent me I consider this the most serious pest that could possibly be disseminated through the olive orchards of the State. The trees upon which it was found were purchased in Italy six years ago, and in that time were so seriously affected that but few leaves remained and the trees made little or no new growth. The twigs were covered with fungus, under which the scales congregated. The trees were cut down and the branches burned. A

close watch will be kept to see that it has not spread. A careful examination should be made of all olive trees that have been introduced from Europe, to see that they are not infested with this scale. The spread of this pest at a time when we have a good prospect of having perfectly clean olive trees in the near future by the good work of the *Rhizobius ventralis*, would be an event to be deplored.

Some time ago the Experiment Station near Pomona received a collection of Turkish date palms from the U. S. Department of Agriculture at Washington, D. C. Recently Mr. S. A. Pease, one of the local inspectors of San Bernardino County, submitted to me for determination portions of leaves from those date palms that were very badly infested with scale insects (*Parlatoria proteus*, Curtis). This scale is not found in other portions of the State, but as the trees are new varieties of a valuable fruit and introduced for experimental purposes, I directed that they be thoroughly fumigated with hydrocyanic acid gas. In Europe this scale also attacks peach and other deciduous trees. The trees will be frequently inspected, and if necessary again fumigated.

In March, samples of pear leaves were sent me from Shasta County, that had the appearance of having been attacked by a fungous growth. A careful microscopic examination showed that the rough blister blotches were galls, and in the center of each was a small opening, through which could be seen microscopic mites. I saw we had a new pest, and determined it to be the "pear-leaf blister mite" (*Phytoptus pyri*). I immediately entered into correspondence with orchardists in different parts of the State, and received infested pear leaves from Solano, Yolo, Sacramento, Yuba, Sutter, Butte, Placer, Modoc, San Benito, and Sonoma Counties. Specimens were also sent me by Mr. M. J. Wessels, Horticultural Commissioner, of Lewiston, Idaho, with the statement that it made its appearance in Idaho three years ago. A request was received from Mr. George I. Sargent, Secretary of the State Board of Horticulture, of Oregon, for samples of infested pear leaves, which, after a thorough disinfection by submitting them to the fumes of cyanide of potassium, I forwarded to him. He wrote to the pear growers of his State and received infested leaves from different fruit sections, that showed the existence of the pest there. This pest is of European origin, and was first referred to by Scheuten, a German, in 1857. It is common in Germany, France, and England. It is also found in Australia. Within the past few years it has demanded attention from pear growers in the Eastern States, and in 1891 it was widespread and serious throughout Canada.

M. V. Slingerland, Assistant Professor of Entomology at Cornell University, Ithaca, New York, in their Bulletin 61, gives an interesting account of experiments conducted to check this pest in 1893. He found that kerosene emulsion diluted with from three to eight parts water, and sprayed on the infested trees before the leaves start in the spring, was very effective. With the strongest solutions the trees were practically free from this pest, and those sprayed with the solution diluted with eight parts water showed very few galls, not more than 1 per cent of the galls that were on the trees the preceding year. As the mites live within the galls during the growing season liquid remedies are of little avail.

Here in the warm, dry climate of California the most effective check to red spider and other mites is a liberal application of dry sulphur, as soon as the leaves start in the spring, with a second or third treatment

during the spring and early summer. As there is an opening in each gall of the pear-leaf blister mite, the sulphur fumes will enter more readily than will a solution, so I advised the use of this in each instance for summer treatment. With the Ditzler attachments to a broadcast seeder for distributing the sulphur, seventy-five to one hundred acres of orchard can be treated in one day. As nearly all the pear stocks used for budding or grafting in the State and in the East are imported from France, I have no doubt but that this pest has been brought in that way.

The "pear-leaf blister mite" is invisible to the unaided eye, and even with an ordinary pocket lens it is difficult to detect them, so that in studying this pest a powerful microscope is required. In a badly infested leaf it is estimated that one thousand mites will be at work within the tissues. The effect of their attacks is to injure the vitality of the tree and cause the leaves of the tree to drop prematurely. This mite is closely related to the "rust mite" of the orange, that produces the russet color of oranges in portions of Florida. It differs from the red spider and most other mites in having but two pairs of legs. In the case of the spider they have three pairs when young and four pairs when matured. In the *Phytoptus* the four legs are near the head, and in traveling the body is dragged along. They are light in color and cylindrical in form.

I visited several orange orchards near Rivera, where the trees were treated with hydrocyanic acid gas last fall and winter, for the destruction of the Florida "purple scale," referred to in my last report. Some of the most seriously infested trees were cut back and the stems and branches scrubbed, and the adjoining trees were treated with the gas. Most of the infested orchards had a second treatment of gas. The result is that after a day's search I failed to find a single live "purple scale," or any that had eggs. Neither could I find any young upon the small fruit or current year's growth in the orchards visited. The work will be carefully followed up and it is hoped that this pest will be stamped out of Los Angeles, Orange, and San Diego Counties, where it had gained a foothold. Where the trees were treated with C. P. cyanide of potassium the result was very satisfactory. One treatment is generally sufficient, and no scorching of the leaves was noticeable. One third less in weight should be used of this grade, so there is very little difference in the cost of fumigation. The saving in freight is considerable. The cause of occasional failure with the 58 per cent cyanide—even from the same package or barrel—was undoubtedly caused by the unevenness of the crystals. Certain chemicals having an affinity would undoubtedly be attracted to each other before solidifying. In the C. P. 98 per cent grade, the cyanide is uniform.

Judge Ross, in the United States Circuit Court at Los Angeles, on April 9th, rendered a very important decision against the validity of the patent granted for the process of fumigating trees or plants in the absence of light. A suit was commenced by the patentees against certain orange growers for the infringement of the letters patent, for an accounting of the profits alleged to have been realized by the defendants, and for an injunction against further infringement. The defendants demurred to the allegations in the complaint. In sustaining the demurrer, Judge Ross, after reviewing the case and the specifications of the patent, said: "An old process does not become a new and patentable one by being used at night instead of in the daytime, or at any particular time or in any

particular state of weather, or because better results are obtained by its use at one time than another." A number of growers have refrained from using the gas because of the threat of suit for an accounting of profits alleged to have been realized by the use of the gas process. Under this decision orchardists having "red scale" can now fumigate instead of spraying their trees, as this is the only process that will kill the scale located upon the fruit. The improved fumigating apparatus can also be constructed at greatly reduced cost from the old styles, so that the most serious objections to the use of this remedy are removed.

Complaints have been received from different sections of the San Joaquin Valley, of injury caused by the "red spider" and "yellow mite," more especially to prune trees. This has been a favorable season for the increase of these pests. The dry sulphur treatment is the only satisfactory method of checking them, and if growers would only attend to this work early in the season there would be no cause for complaint. After the spiders have damaged the leaves nothing will restore their vitality.

Respectfully submitted.

ALEXANDER CRAW.

AUGUST 15, 1894.

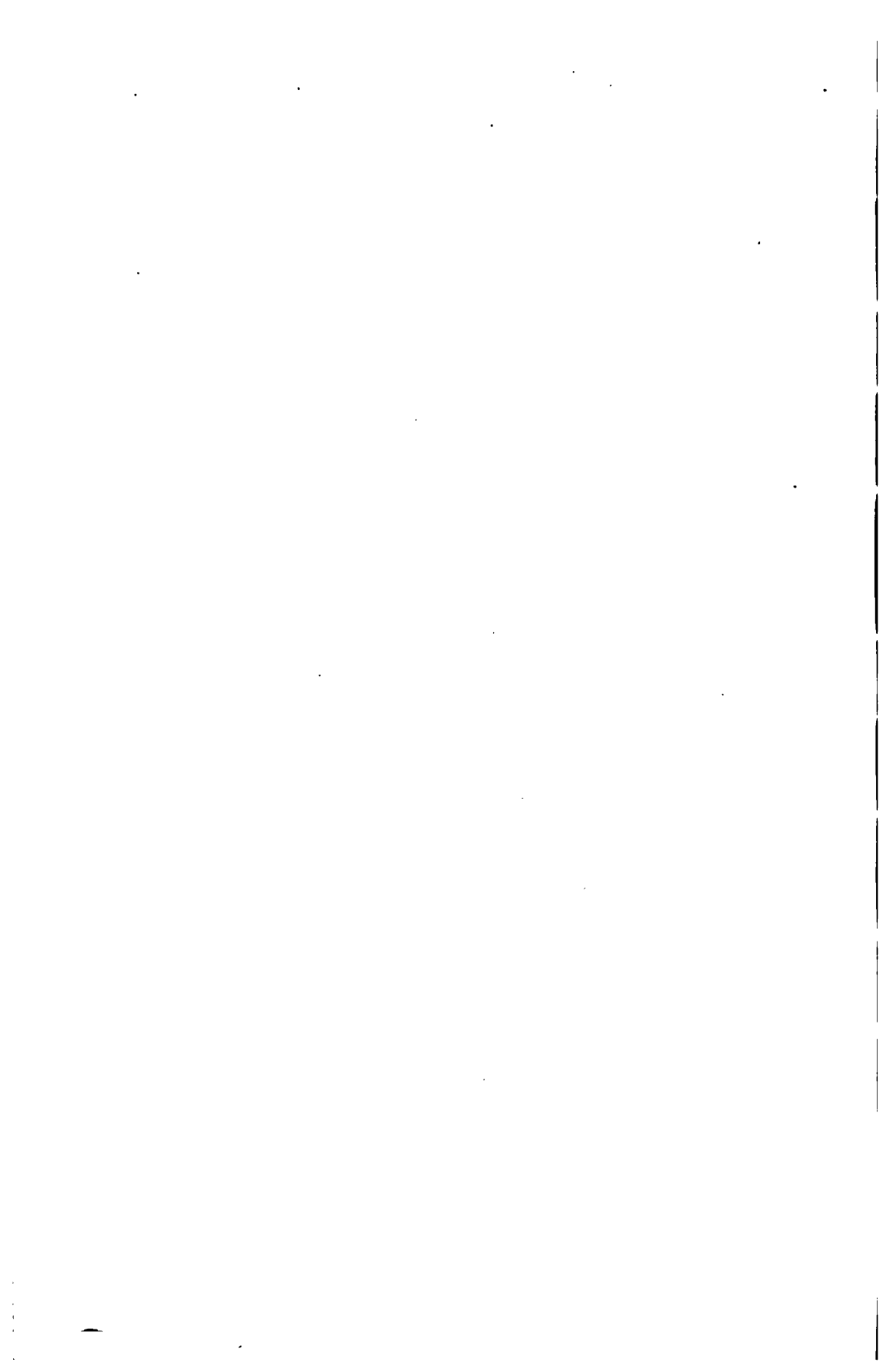


EXHIBIT AT MIDWINTER FAIR

AND

HORTICULTURAL DAY TREE.

EXHIBIT AT MIDWINTER FAIR.

The horticultural and entomological exhibit of the State Board of Horticulture at the Midwinter Exposition was probably the most instructive exhibit at the fair. There was displayed most every variety of fruit grown in our State, properly classified, as also the beneficial and injurious insects, both native and imported, and also samples of leaves and trees, upon which were shown the effects of insects and of various diseases from abroad, thus far unknown on this coast and taken from quarantined stock. In speaking of the exhibit the "San Francisco Chronicle," of February 18, 1894, says:

In the gallery of the Horticultural Building at the Midwinter Fair, an exhibit is installed which from both an educational and a spectacular point of view is second to none within the grounds. It is that of the State Board of Horticulture. The exhibit occupies a conspicuous place in the gallery bordering the space under the dome. It is a complete technical illustration of the horticultural industry of the State, and in addition contains the finest entomological collection in America. It is the latter which will be most popular with the public. Besides the interest that attaches to the aggregation of insects and the rarity of such collections, the beauty of this part of the exhibit will appeal to the visitor very forcibly. The collection for the most part belongs to the Board; but Professor Albert Koebele's collection constitutes a part of it. It occupies 280 square feet of room in showcases, though only the more interesting part of the Board's collection will find room in it. There are 9,000 named species of insects, among them 800 varieties of butterflies. The world, from the emerald meadows of Cashmere to the summit of the Sierra Nevada, has contributed to perfect this butterfly collection. It is something that one can spend hours over with pleasure. From the ordinary sagebrush butterfly to the noblest specimens of the order, showcase after showcase is filled with the rich-colored airy voyagers. Among the largest and by far the most beautiful of the butterflies is a specimen from Brazil. Its colors are jet black and Nile green, and on the edge of its wing it has hair. It is said that but six specimens have ever been secured. Those who have not chased butterflies in their leisure hours will be surprised to find what California has to show in that line. Some of the butterflies peculiar to the coast, as far south as Mexico, are for size and color among the finest. The caterpillars of many varieties, both of butterfly and moth, are shown. There are specimens of South American moths, in size and beauty nearly equal to the finest of the butterflies. The educational advantages of the exhibit will be of great benefit to school teachers who have entomology in the curriculum of their schools, and to the vine grower who is troubled with caterpillars and scale. They will find everything there in the insect line from the gall fly, scarcely discernible with the unaided eye, to a grasshopper five inches in length and a moth four inches across the wings. There is also a fine collection of beetles, including the mammoth sacred beetle of Egypt. One thing that impresses the inspector without an entomological education is that fifty specimens of what seem to be exactly the same kind of butterfly not only differ, but are of entirely different varieties. An effort has been made to show specimens of everything in the horticultural line grown in the State.

All the showcases and counters used at the Midwinter Fair were so made that when the fair closed they were placed in position in the rooms of the State Board of Horticulture, and are filled with rare and valuable specimens pertaining to our work. The fruits in jars also form part of the exhibit, as do the fruits which were prepared in our own experimental cellars. (See illustrations showing rooms, experimental cellar, etc.)

CELEBRATION OF HORTICULTURAL DAY.

On June 8th, "Horticultural Day" was observed at the Midwinter Exposition, under the auspices of the State Board of Horticulture. At one o'clock the State and County Commissioners to the Exposition, Superintendents of Exhibits, and friends assembled at the San Mateo Building, and from there marched, paying their respects to all the county buildings along the line. At the west side of the Fine Arts Building they halted and faced the building for the purpose of planting a tree in commemoration of the day.

HORTICULTURAL DAY TREE.

B. M. LELONG (Secretary of the State Board of Horticulture): Ladies and Gentleman, Fellow Citizens: This day has been set apart by the management that we, the lovers of horticulture, may meet and by proper observance commemorate the day by planting on these grounds a tree that shall mark a special era in the history of this fair, and which is to remain after this great Exposition closes and our labors as Commissioners and Superintendents of Exhibits are over. We shall therefore plant this tree—an olive tree—an offspring from the famous historic trees at San Diego, over a century old, from which dates the first period in the horticultural history of our State, and from which trees sprang an industry of great commercial importance to our State.

In 1767 the Jesuits were driven from the missions in Lower California, and everything they had was turned over to the Franciscan monks. Junipero Serra was selected as the President of the missions, and set out for his field of labor. The Dominicans clamoring for a share in the mission work, a division was made, and in 1769 the Franciscans started northward, entering upon and occupying what is now the State of California. José de Galvez, Visitor-General and secular head, representing the King, with Father Serra, proceeded to make arrangements for the establishment of new settlements. Galvez seems to have been far-seeing, for in the manifests of the vessel sent it is found that he had caused to be shipped to Alta California, flower, vegetable, and fruit seeds for garden and orchard, and grain for the field. Twenty-one missions were established, all but three of which had gardens and orchards.

Thus, in the very early days, we find introduced the olive, the fig, and the grape. The trees were grown chiefly from seed, and were probably all, or nearly all, seedlings. Of these, there are three that have been perpetuated, namely, the Mission olive, the Mission grape, and the black fig, now designated as the Mission fig. In 1792 there were growing near the Mission San José, apples, pears, apricots, peaches, and figs; and at San Buenaventura, in addition to these, oranges, limes, grapes, olives, and pomegranates. At this time there were in the several missions about five thousand bearing trees. This was, of course, a very small number, but these trees played an important part in the horticultural

advancement of the State. They showed the possibilities in fruit culture, and furnished seeds, stock, and cions, and from the vineyard, grape cuttings, for many orchards and vineyards.

Fruit culture in early days in California was incidental. That it would ever become the chief industry of a great commonwealth was not then dreamed possible. The Franciscan fathers when they brought a few seeds with them, did so in order that they might have some of the fruits they had enjoyed in their native land for their own tables, not for the purpose of cultivating orchards for the benefit of others, or for producing fruit for sale. Their efforts were devoted to the building up of their missions, increasing the number of their adherents, and enlarging the herds in which the wealth of their missions lay.

Ladies and gentlemen, I thank you for your attention, and now take pleasure in introducing to you a most distinguished lady, Miss Nellie Boyd, who will read a poem especially prepared for this occasion.

MISS NELLIE BOYD:

If you'll turn back in history's pages,
And likewise backward turn your vision,
To those dear and dim and distant ages
Of holy padres and their mission,
I shall try to tell you briefly
Of the reason why we chiefly
Have the olive tree selected
And why it ever be protected.
Long ago from ancient Spain
Sailed the fathers good and kind,
For this land not touched by culture,
Hoping here a field to find
Where to teach and where to labor.
Knowing well the olive's value,
They with wisdom and with forethought
Brought to this shore on their ships
Olive seeds and olive slips.
They were planted 'round the Mission
To the solemn pealing of the bell
And the gentle murmur of the ocean's swell.
Long since have the fathers turned to clay;
Yet some trees do stand to-day
As a living monument
For their lives so godly spent.
From those trees there by the bay,
We will plant a slip to-day.
May, like its prototype, it be
Of this Fair a memory,
Ever lasting and ever green.

Miss Boyd received an ovation at the conclusion of the reading of the poem. Her voice throughout never faltered and every word was heard distinctly by all present.

MR. LELONG: I now take pleasure in introducing to you Mr. Frank Wiggins, Superintendent of the Southern California Building, and Mr. Frank H. Buck, Superintendent of the Northern and Central California Building, who will superintend the planting of the tree, assisted by Mr. John McLaren, Superintendent of Golden Gate Park, and his assistants.

MR. BUCK: Ladies and Gentlemen, it affords me much pleasure to assist the State Board of Horticulture in carrying out these exercises. This is a beautiful lesson; it will do us all much good and be of much benefit to our children, for there is but one sentiment among us all, and that is that we are all working for the interests and advancement of our State. (Applause.)

MR. WIGGINS: Ladies and Gentlemen, Mr. Buck has voiced my sentiments. (Applause.)

The tree was then lowered by Mr. McLaren's assistants, and each passing visitor threw in some soil, until the roots became completely covered.

MR. LELONG: Ladies and Gentlemen, it affords me much pleasure to introduce to you the oldest Commissioner to this Exposition, Col. B. B. Jackson, of Yreka.

As Colonel Jackson approached, two banners, "San Diego" and "Siskiyou," that were carried in the procession tied together, were placed over the tree.

COLONEL JACKSON: Ladies and Gentlemen, I have been asked to say a word or two on this memorable occasion, because, as Mr. Lelong said, I am the oldest Commissioner to the fair. I have, thank God, lived to see the great advancement of our great State, and if my good health means anything for the claims made for California—I am eighty-six years old, and I doubt if there are many who to-day are younger in spirit—there is no better place to live in. The banners you see here tied together and held over this tree—Siskiyou and San Diego—show that united we are Californians, and that we have but one object in view—the prosperity of our Golden State. I join with you all in wishing that this tree may live, and that we may all live to see the fruits of our labors. (Applause.)

MR. LELONG: The tree is now planted; it is proposed we give three cheers for this day, and that the tree may live.

They were given with a whoop and the procession moved on to the Horticultural Building, where the exercises pertaining to "Horticultural Day" were held.

HORTICULTURAL DAY EXERCISES.

MR. LELONG: As Chairman of the Committee on Arrangements I have the distinguished honor of calling this vast assemblage to order. This is Horticultural Day, a day set apart for its observance. In the parade Mrs. George H. Flournoy, of Tehama County, and Mrs. J. A. Brown, of Riverside County, carried these bouquets [pointing], grown in their respective counties, and placed on this stand by them, which, with the two banners, Siskiyou and San Diego, carried tied together, illustrate the one prevailing sentiment of unity existing among the Commissioners and Superintendents of Exhibits from the different counties to this Midwinter Exposition, which I hope will continue inseparable. (Applause.) It affords me great pleasure to introduce to you the President of the Day, Hon. L. W. Buck.

MR. BUCK: Ladies and Gentlemen, I have been called upon somewhat unexpectedly to preside at this meeting to-day, and I must therefore beg your indulgence for the brief remarks that I may make. I can assure you it is an honor which I appreciate to be called upon on this Horticultural Day. From the number of people present I am more than ever impressed with the importance of our calling, the oldest in the history of man, and originating in paradise itself for his punishment; the greatest blessing of our primeval parents was that they should work in the soil, and then Adam delved and Eve spun. The interest of the ladies in the success of horticulture, and certainly in bringing this



MISSION OLIVE TREE. From the famous historic trees at San Diego, over a century old, from which dates the first period in the horticultural history of California. Planted at the west side of the Fine Arts Building, Midwinter Fair, Golden Gate Park, June 8, 1894.

about, is evidenced by the ladies present who are wearing the horticultural badge to-day. The labors of our ladies are no longer confined to the nursery, but have taken a wider scope and extend to the field, the garden, and the orchard. Some of the most successful of our California horticulturists to-day are ladies, and I think that there has been a great improvement in the quality of the fruit since they went into the business. (Applause.)

You know ladies always had a longing for fine fruit—that is what got us into trouble in the first place. But as woman has stood shoulder to shoulder with us in our toils and troubles, we will overlook the apple episode and acknowledge her equal rights to grow as good fruit as any one.

As the present celebration is under the auspices of the State Board of Horticulture, a brief review of the work of that organization may not be out of place on this occasion. Fruit was introduced into California by the mission fathers as early as 1769, but no attention was paid to it; like Topsy, it "was left to grow." When the gold fever broke out and the American influx occurred, some of the pioneers brought with them seeds and cuttings of Eastern fruits, but it was not dreamed that the industry would ever become permanent. The peculiarities of California soil, however, and especially her climate, soon demonstrated that fruit would do better here than elsewhere in the Union. When Horace Greeley visited us in 1858 he predicted that California would some day become the orchard of the nation. How well his predictions have been realized! Fruit growing was a matter of small importance then. We had our home market, and that was all. We produced the largest, juiciest, and most highly flavored peaches, pears, plums, and apricots, and consumed them at home. We knew all about their good qualities, and so we wrote to our Eastern friends and told them. But our fruits were unknown to the world; there were over two thousand miles of mountain, desert, and forest countries between us and the rest of creation, and we could not hope to ship our products to them.

The driving of the last spike in the Central Pacific Railroad, in 1869, however, changed all that. At that time the fruit industry of the State, as a commercial enterprise, may be said to have had its birth. It was not a thrifty youngster for many years. Freights were exorbitantly high, transportation slow, and few samples of fruit found their way to the Eastern market. But those few opened the eyes of the Eastern people, and a demand sprung up for the fruit. Freights were lowered and the orchard business grew, until to-day it is the most prominent industry in the State. There is now more money invested in it, and more men employed in it, than in any other industry in California.

A business of such growing importance needed legislative encouragement. All sorts of stock were brought into the State. Pests and diseases of various kinds found a footing here, and the industry was seriously threatened. The viticulturists had organized for their protection and they were doing good work, and the fruit growers turned to them for protection to their business. In compliance with their demands a branch was added to the viticultural division, and in course of time it became the horticultural department. This answered for a time, but was after all but a make-shift. Soon it was found that the new department was inadequate and had outgrown the original. It was then that horti-

culture cut loose from viticulture, and in 1881 the State Board of Horticulture was organized.

The Organic Act provided for dividing the State into seven horticultural districts, each of them entitled to one Commissioner, and in addition, there were two Commissioners for the State at large. Their duties were, so far, to prevent the spread of contagious diseases among fruit trees and to prevent and extirpate fruit pests, and to make regulations enabling them to perform these duties in the State. A County Board of Horticultural Commissioners was provided for, acting with the State Board, the territory subdivided into districts, each one of which was under local inspectors, whose duty it was to visit all orchards and see that no pests or diseases were allowed to obtain a foothold.

I shall not take up your time in giving details of the amount of work done by these officers. Many of the Eastern States have been visited by diseases and pests; they have the yellows in the peach districts and the curculio in the plum regions. California is so far free from the influence of these pests.

One piece of work done by this Board is familiar to us all: that is, the destruction of the cottony cushion scale by the *Vedalia cardinalis*. It is but a decade ago when the orange industry seemed doomed to destruction; there seemed absolutely no hope for it. But, on a suggestion made by a gentleman now connected with this department, that inasmuch as this scale was not considered a pest in its native land, there must be a parasite working on it there, and that the parasite should be looked for. As the agent of Hon. Frank McCoppin, Professor Albert Koebele was sent to discover it, and the result was the little ladybird, which soon delivered our most important industry from absolute ruin to a remarkable prosperity. We now ship over seven thousand carloads of oranges annually, while, had it not been for the *Vedalia*, we could not ship any. Had this Board accomplished nothing else, that one act would compensate for all its labors. Later importations have done equally as valuable work, especially the *Rhizobius ventralis*.

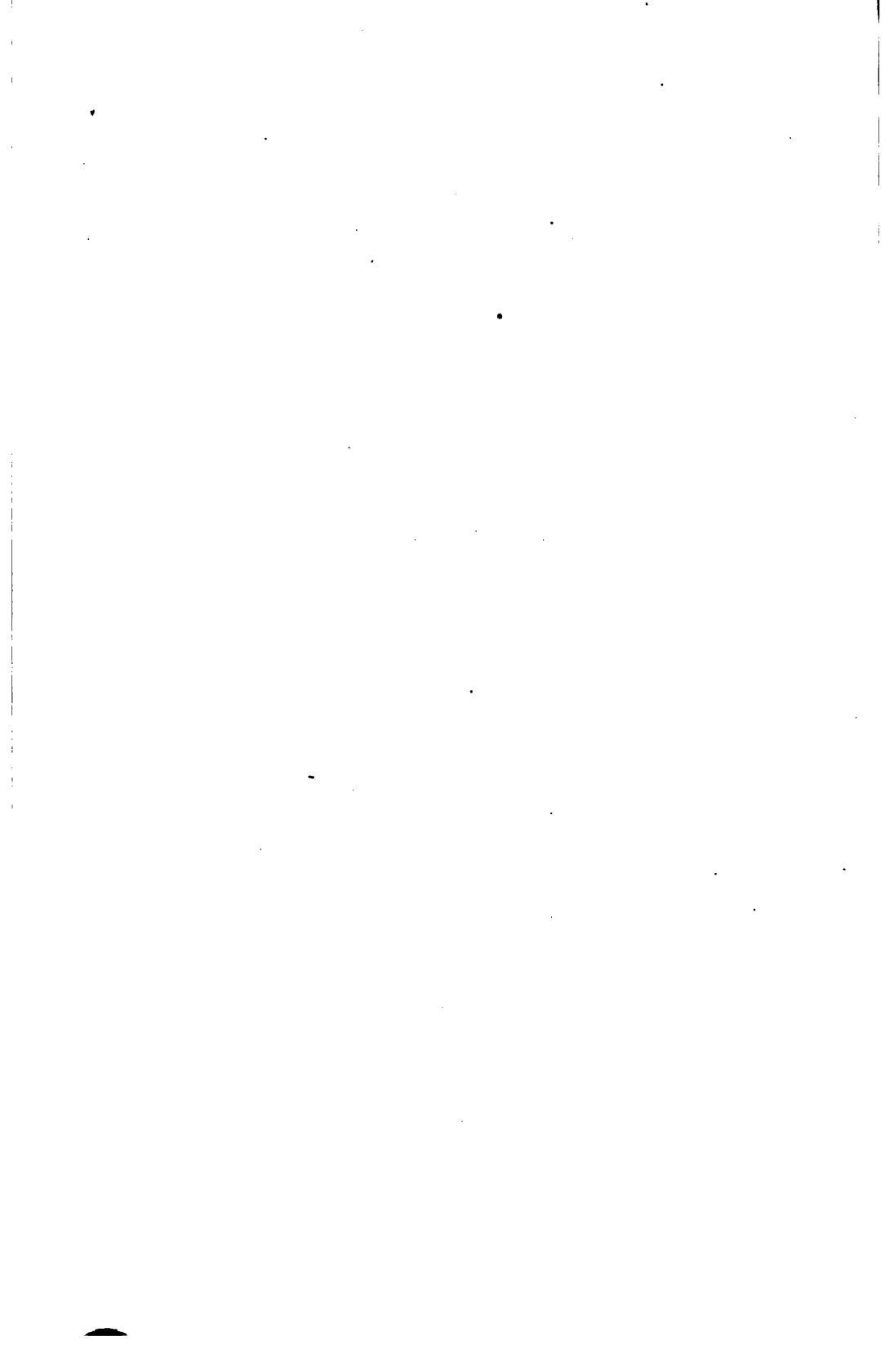
There is not a shipment of trees or plants from foreign lands or from other States to California that does not undergo careful inspection before it is admitted, and, my friends, you who do not know the workings of the Board, are not aware of the dangers which our largest industry has escaped through these conscientious labors. There is no steamer arriving in this port from China, Japan, and the Islands which does not bring some new and threatening pests, and these all find their way to the bottom of the bay and are never heard of.

But it is not in its protective measures alone that the Board has done its work. In its experimental department much excellent labor has been done, and here I want to give credit to our Secretary, Mr. Lelong, for his careful experiments and valuable discoveries. A little anecdote will illustrate the work. Mr. Lelong had experimented in curing figs. Some time afterwards he came across some nice fruit, packed by a gentleman in the South. He wrote to inquire his process, and was informed that it was that published by the State Board of Horticulture. It was his own process (Lelong's). Experiments have been conducted in budding, grafting, cultivating, fertilizing, packing, and, in fact, in all the departments of the fruit business, and these have been published in the reports and bulletins of the Board and distributed among our fruit growers.

Another feature is the annual convention of fruit growers, held under the auspices of this Board, at which the leading horticulturists of the State meet each other and interchange ideas and methods. These all have had a tendency to build up horticulture, to improve our methods, and have made the industry what it is: the one great industry of our State of California, the orchard of America; and, my friends, I can say knowingly, that it is largely due to the labors of the State Board of Horticulture that California in the past twenty years has advanced to the front line—from a point of insignificance to one of prime importance.

We have, to-day, over half a million acres in the State, and are shipping fruit, not by the package or carload, but by the trainload. If I had been able, I would have given some statistics in regard to the shipment of fruit in some of the past years. I will state—and it is not because I belong to Solano County that I state it, but because it is the place I know of—in the year 1892, the Bank of Vacaville, which only represents a very small territory, shipped about one million dollars' worth of fruit. There have already been shipped from Vacaville this year about forty carloads of fruit, much of which has been sold at very good prices, and returns received back for it. I only speak of it because it is the point I know of, and if I had had more time I would have obtained statistics from other points. California sends out whole trainloads of walnuts, oranges, raisins, and deciduous fruits. A special freight service handles our products in millions of pounds. This season will see an output of nearly 40,000,000 pounds of prunes, 60,000,000 pounds of raisins, and equally large in other lines. The industry is still growing, and for its protection we are under the careful guardianship of the State Board of Horticulture and its numerous agents now in all parts of the State. We owe much of the success of this branch to the fostering care of our legislators, and much more to the faithful labors of the State Board and its officers. (Applause.)

Addresses were made by Mr. M. H. de Young, the Director-General, Hon. Morris M. Estee, Gen. N. P. Chipman, Gen. W. H. L. Barnes, Prof. Emory E. Smith, and others, to whom this Board is indebted for their courteous aid, as well as to all who assisted in the celebration.



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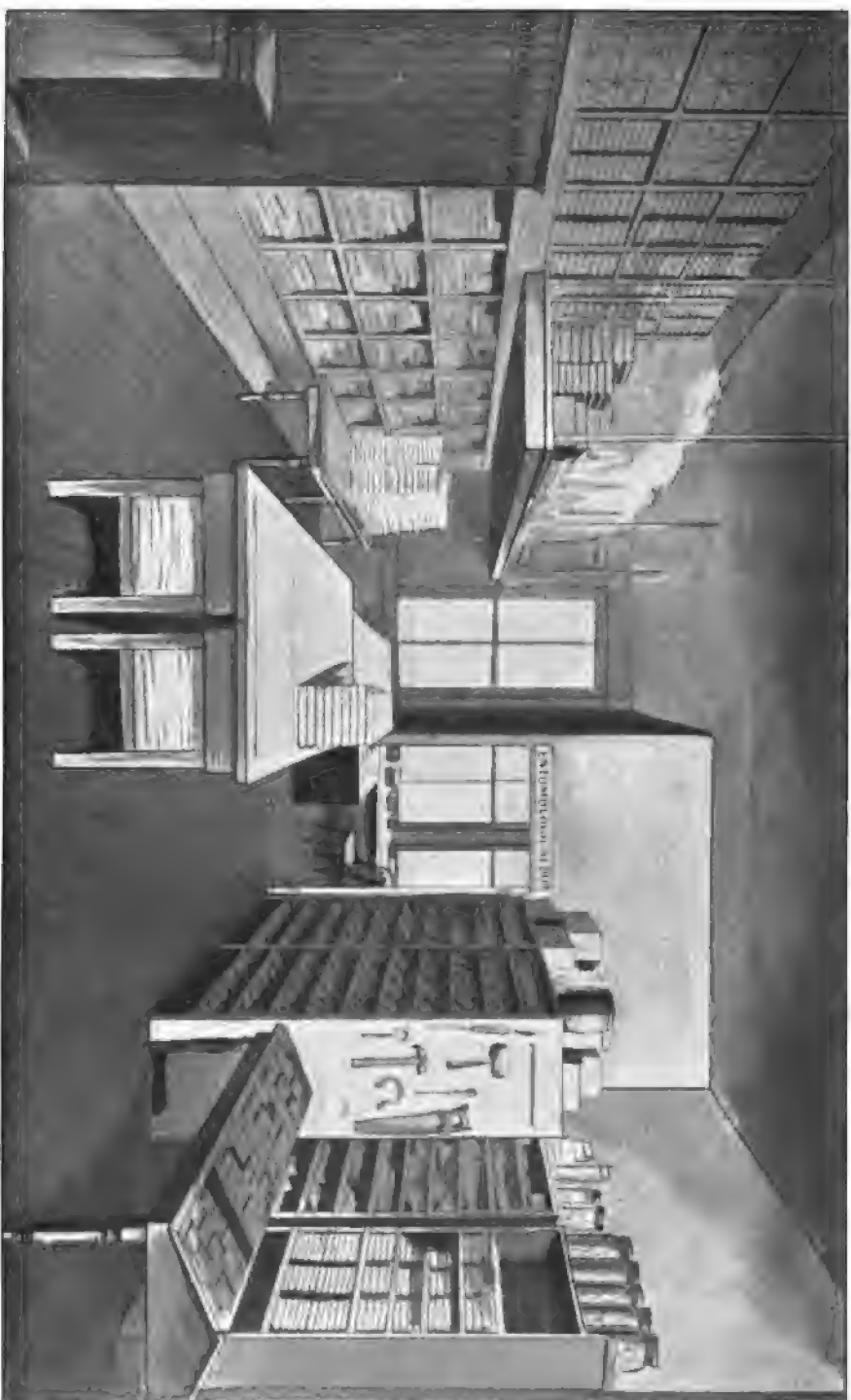
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BOARD OF DIRECTORS AND SECRETARY'S OFFICE.



ASSEMBLY AND EXHIBITION ROOM.



STORE AND WORK ROOM.

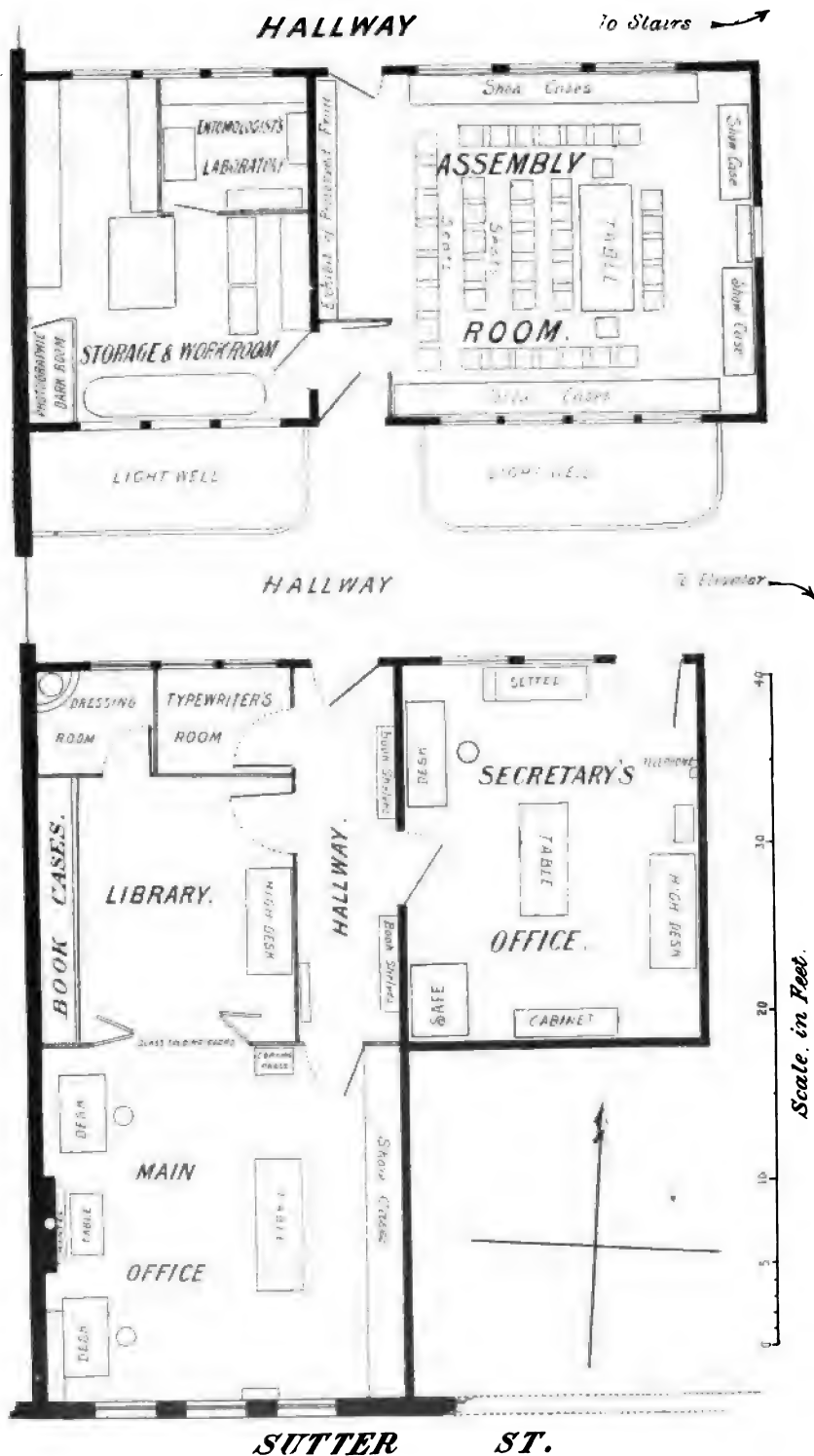
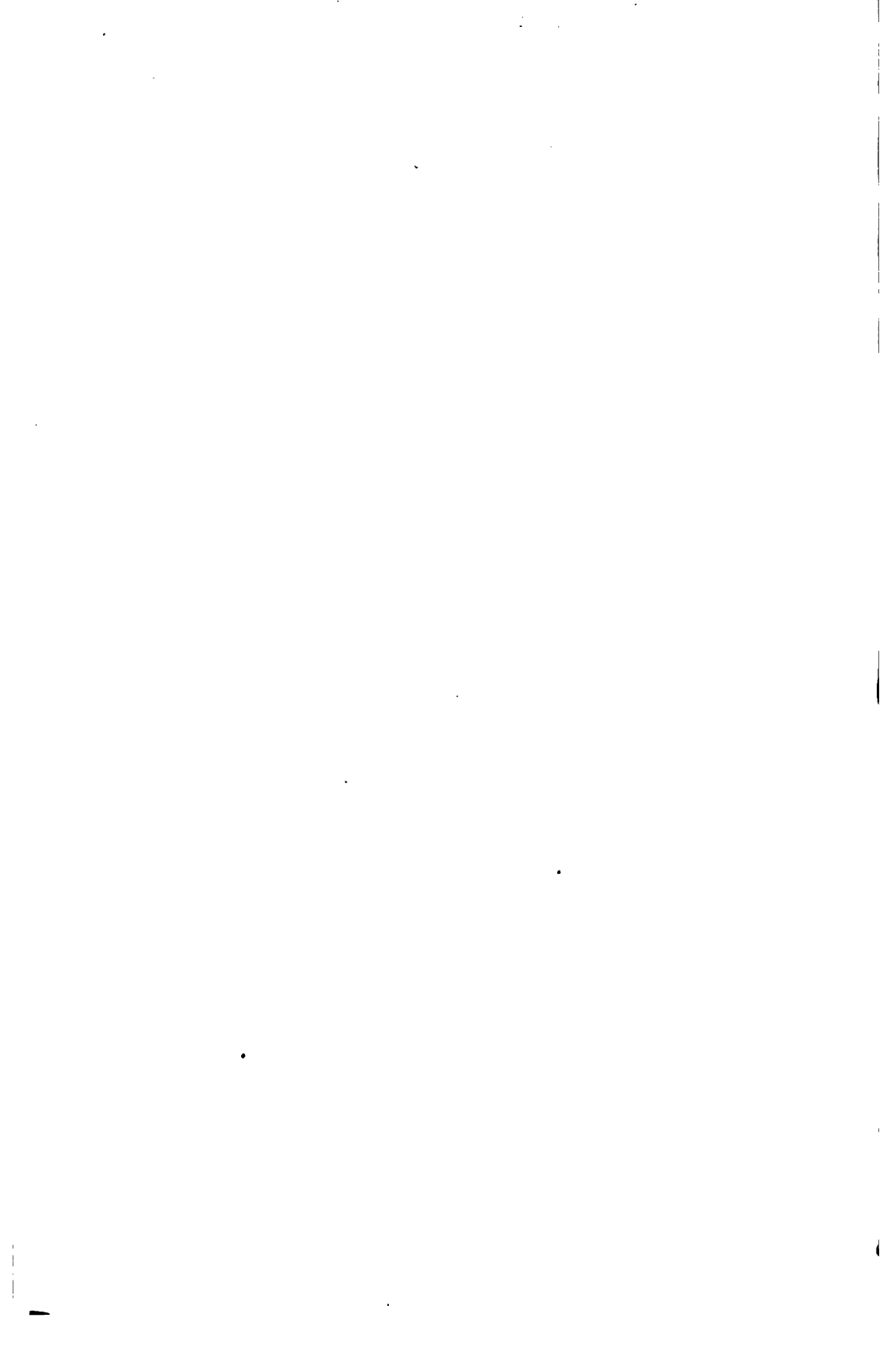


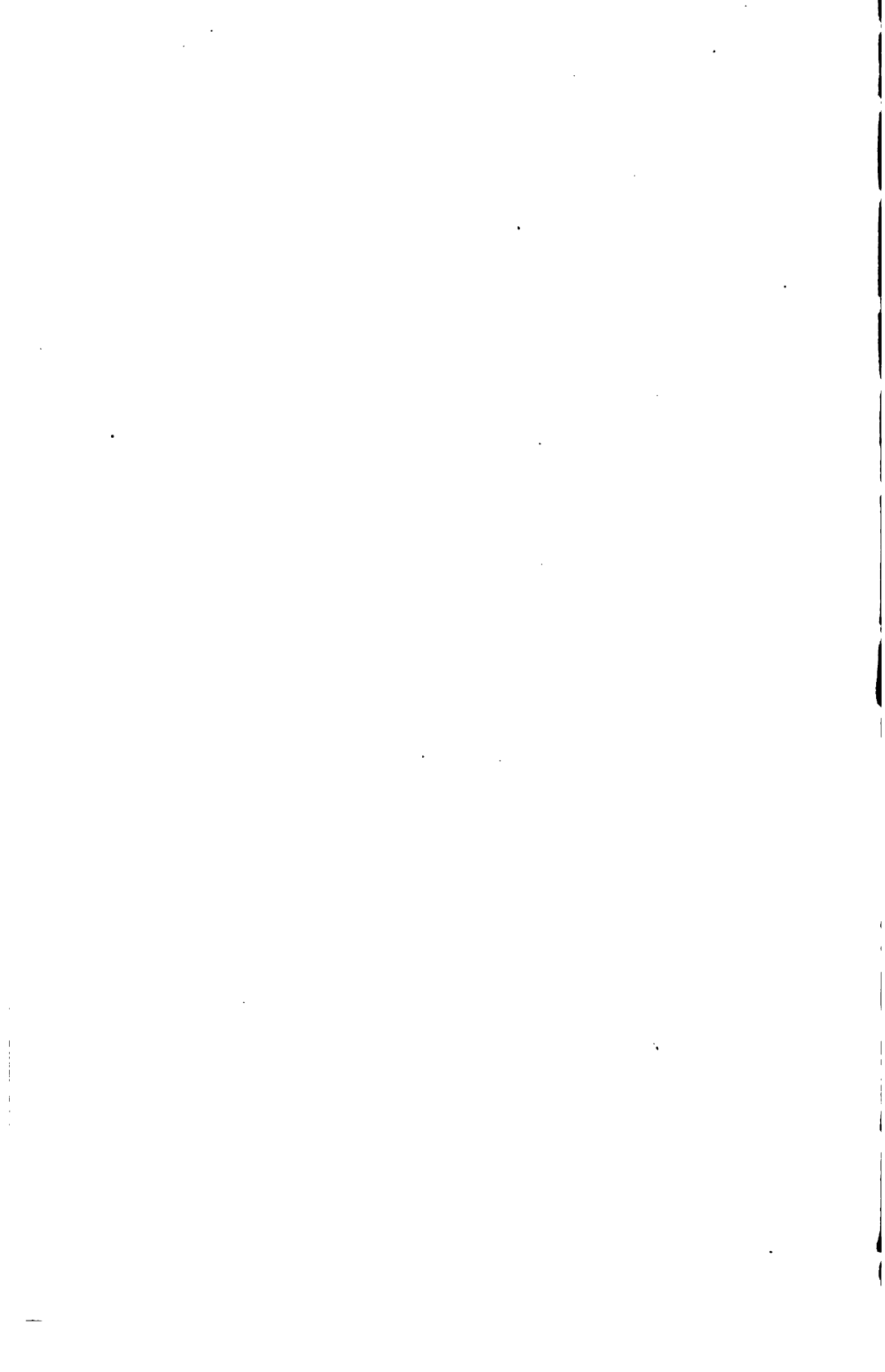
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EXPERIMENTAL CELLAR. (Olive Culture).



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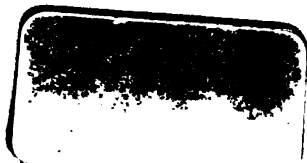
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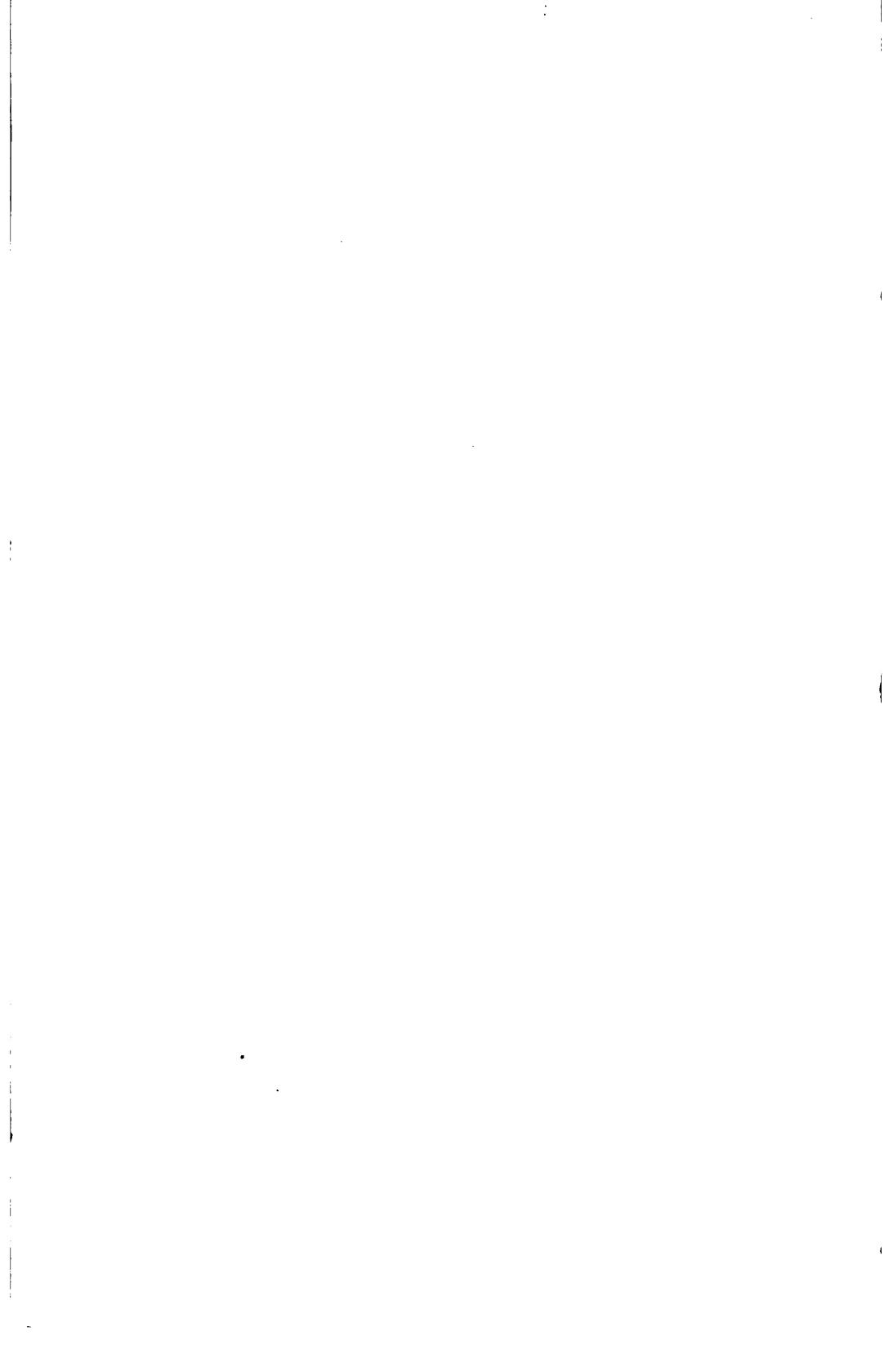
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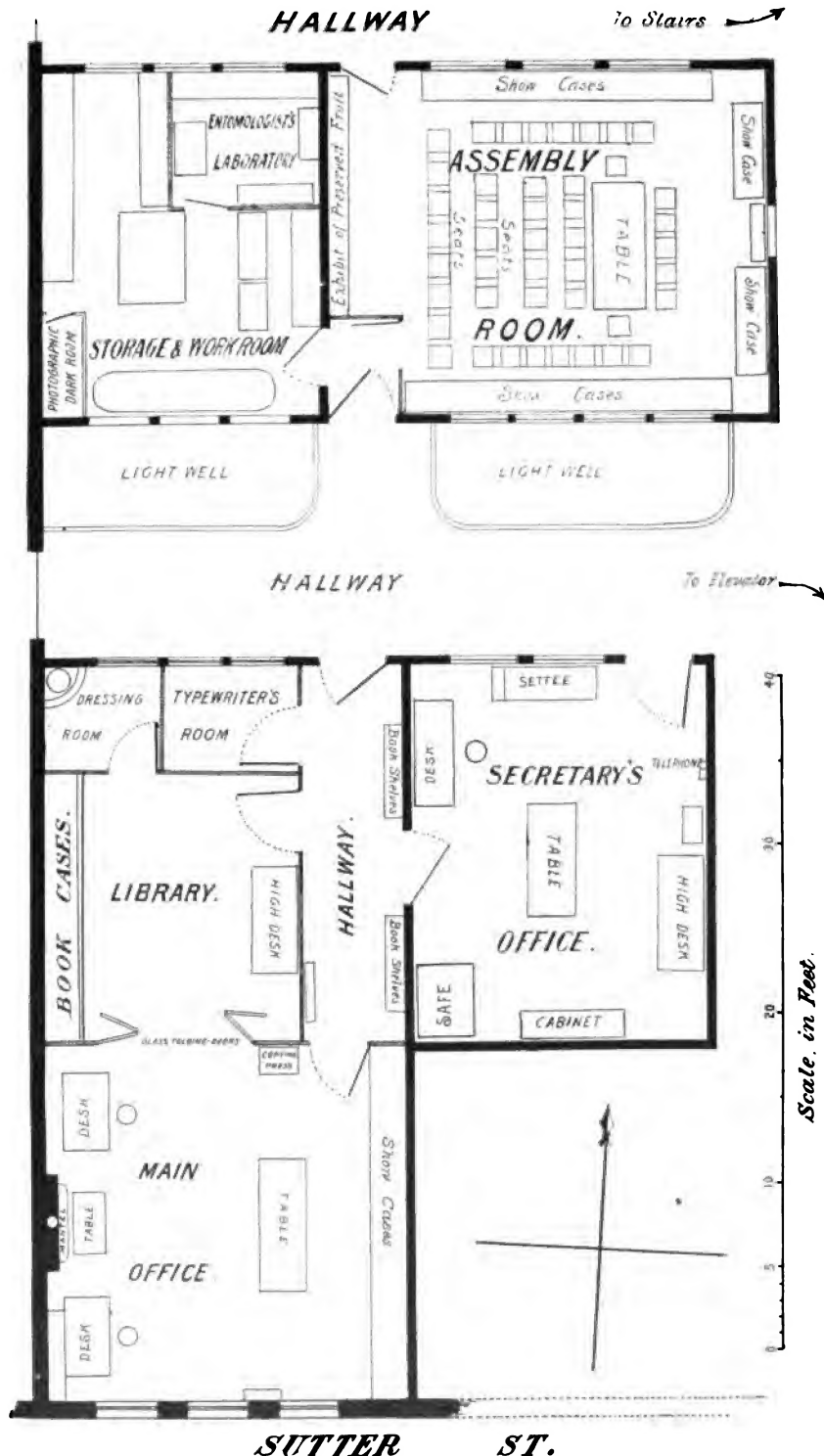
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